PIT AND QUARRY

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PERIODICAL DIVISION

SEPTEMBER, 1940

Grinding Sand to Meet Fine-Aggregate Specifications . . . Ohio Marble's New Piqua Plant
Theories and Specifications for Cement . . . Proportioning Concrete for Pinopolis Dam

Regardless of Application

HAZARD LAY·SET *Preformed* Handles Easier

GREEN SIGNIFIES SAFETY

Whether it is on a carryall, dragline, concrete mixer, power shovel, clamshell, skip hoist—or what not—Hazard LAY-SET Preformed is appreciated by the workmen *because it handles easier*. The preforming process, back at the mill, gives it that advantage. Preforming eliminates internal strain thereby making LAY-SET limber, flexible, easy to reeve. Therefore, LAY-SET resists kinking, resists rotating in sheave grooves, resists the fatigue of bending. LAY-SET requires no seizing as it won't fly apart when cut.

Crown wires that finally wear through will not porcupine to tear workmen's hands and possibly cause blood poisoning. This makes Hazard LAY-SET Preformed a *safer* rope to use. Small wonder the workmen like it.

The bosses in the office like it, too, for the records reveal that Hazard LAY-SET Preformed lasts longer. *Much* longer. That means less frequent rope replacements and shutdowns—more work done.

Specify Hazard LAY-SET Preformed for your next line. All Hazard ropes made of Improved Plow Steel are identified by the Green Strand—and remember, Green Signifies Safety for both men and pocketbook.

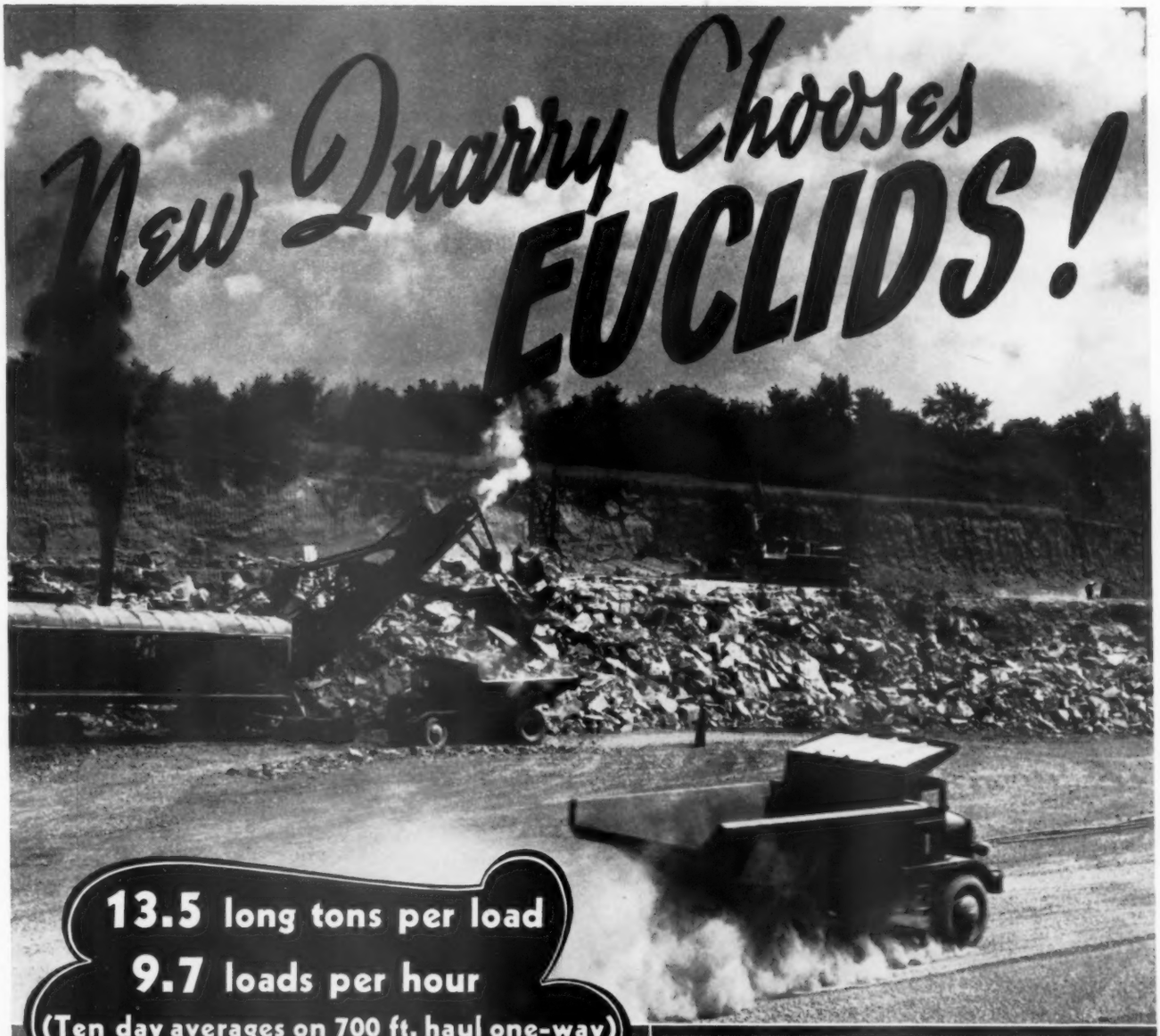
HAZARD WIRE ROPE DIVISION

Established 1846

AMERICAN CHAIN & CABLE COMPANY, INC., WILKES-BARRE, PA.

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

New Quarry Chooses EUCLIDS!



13.5 long tons per load
9.7 loads per hour
(Ten day averages on 700 ft. haul one-way)

A leading industrial limestone company leads the way in modernizing quarry methods by installing five 15-ton Rear-Dump EUCLIDS for hauling all stone and overburden in its newly opened quarry near Bessemer, Penna.

. . . . . in quarries and ore mines — on airports, roads, and dams — Rear-Dump EUCLIDS are setting a faster pace in efficient production and lower hauling costs . . . .

— investigate EUCLIDS today . . . . increase your profits with EUCLIDS tomorrow!

THE EUCLID ROAD MACHINERY CO.
CLEVELAND, OHIO U. S. A.

EUCLID
THE PIONEER

PIT AND QUARRY, September, 1940, Vol. 33, No. 3. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.

G.T.M.-Specified
GOODYEAR STYLE M SAND
SUCTION HOSE (smooth bore)
for heavy-duty service
A
B
C
D
A — Extra heavy tube specially compounded to resist cutting action of sand
B — Rubber-impregnated duck "anchor" strip prevents tube from being drawn out by suction
C — Heavy wire spiral keeps hose from collapsing under suction
D — Multi-ply carcass of heavy duck with abrasion-resisting rubber cover.
Made in all sizes — lengths up to 50 feet

It DOUBLED their suction hose life

EIGHTEEN MONTHS was the maximum service being obtained from sand suction hose in a large midwestern operation. The hose just collapsed from extreme wear and abrasion at the severe bend, shown in this photograph.

In May 1936 a length of Goodyear Style M Sand Suction Hose was put in this line on recommendation of the G. T. M.—Goodyear Technical Man. It remained in service until August 1939 before failing—a total of 39 months' wear, or *more than twice as long as any previous hose.*

Needless to say the replacement was another length of Goodyear Style M Hose. In fact, all suction lines are now 100% Goodyear-equipped. The company estimates that the longer life of Goodyear hose has cut their hose cost in half!

You will get the same trouble-free, economical service from all G.T.M.-specified hose, conveyor and transmission belting. Let the G.T.M. show you why. To bring him to your office, write Goodyear, Akron, Ohio, or Los Angeles, California —or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER

GOODYEAR

BELTS
MOLDED GOODS
HOSE
PACKING
Made by the makers of Goodyear Tires

THE NEW 1¼-YD.

LORAIN-69

Has Everything!

POWER Center Drive design of turntable guarantees direct-to-the-point delivery of Diesel power with minimum loss or delay.

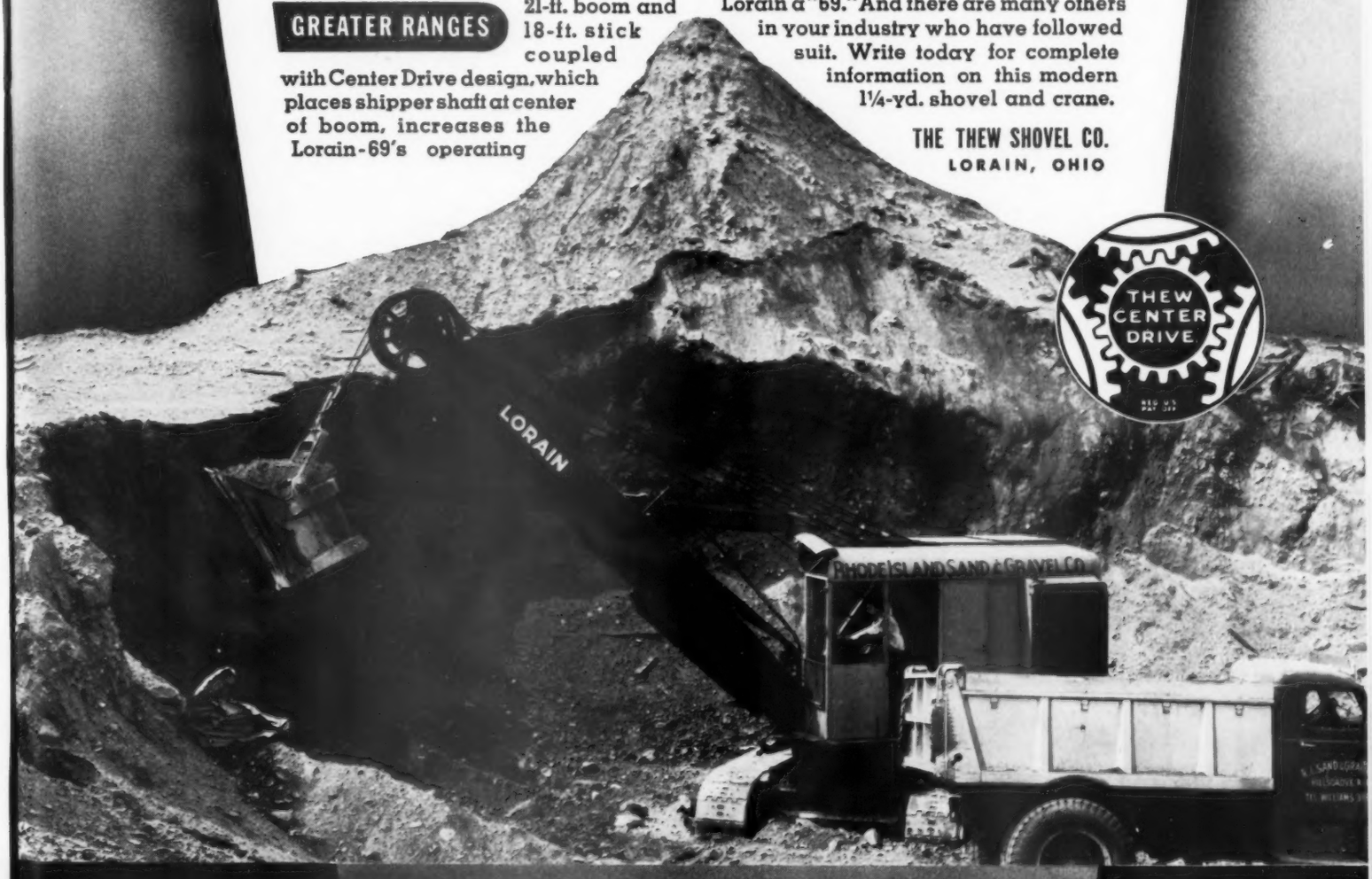
STRENGTH An all-welded shovel boom and stick, a more simplified turntable using fewer and stronger parts and a big, 2-speed Center "Chain" Drive crawler are your assurances of long life and low-cost maintenance.

GREATER RANGES 21-ft. boom and 18-ft. stick coupled with Center Drive design, which places shipper shaft at center of boom, increases the Lorain-69's operating ranges to a new high for 1¼-yd. shovels.

EASE OF OPERATION Vacuum control of crowd, retract and travel clutches, swing clutches and crowd brake makes for smooth, effortless operation, yet retains the normal feel and flexibility of clutch response and action.

These are the features which prompted the Rhode Island Sand & Gravel Co. of Hillsgrove, R. I., to make their second Lorain a "69." And there are many others in your industry who have followed suit. Write today for complete information on this modern 1¼-yd. shovel and crane.

THE THEW SHOVEL CO.
LORAIN, OHIO



1¼ YD. LORAIN 69

Every Job . . . .

SHOWS A BIGGER PROFIT

with.. Brooks LOAD LUGGER

Trade-Mark Registered

Wherever LOADING IS DONE BY HAND

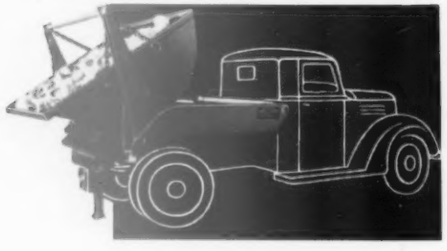
Why be satisfied to "break even" on a job when you can show a profit by using better methods!

Brooks LOAD LUGGER has revolutionized material handling operations and established a new low level of costs on hand loading jobs.

The above picture is a typical application of this modern dump truck on quarry work. Note how simple it is. Each crew of men is served by a Load Lugger and a set of dump buckets. The men do the loading while the Lugger does the hauling. No waste time, no idle equipment. You can handle more yardage than with a fleet of trucks which would get in each other's way.

The Load Lugger system increases truck efficiency and makes the work easier for the men. It is great for keeping crushers busy all day long . . . for supplying materials to construction jobs . . . for hauling away overburden . . . for transporting asphalt or concrete mixes. Ask for Bulletin.

Built in sizes from 1½ to 4 cu. yds. capacity.



Showing Load Lugger with 2-yard bucket mounted on 1½-ton truck.

Special **INTRODUCTORY OFFER . . .**

You can prove the economy of the Load Lugger on your own jobs . . . write for details today.

Brooks EQUIPMENT AND MFG. CO.

Distributors in all Principal Cities

109 Davenport Road

KNOXVILLE, TENNESSEE

TELSMITH
GRAVEL PLANTS
facts you can put your finger on
SEMI-PORTABLE sand and gravel PLANTS
CLAY... HARD TO WASH MATERIALS
DREDGE OPERATIONS
100% CRUSHED GRAVEL and regular gravel
COMMERCIAL sand and gravel PLANTS
ABOUT
GRAVEL PLANT LAYOUT
SEMI PORTABLE SAND AND GRAVEL PLANTS
LAYOUTS FOR MATERIALS DIFFICULT TO WASH

GET THE NEW

BOOK of GRAVEL PLANTS

(NOT A CATALOG)

This book is *different!* It's *not* a machinery catalog. That's why it will be of great value to you. It is a complete collection of gravel plant layouts . . . of every type . . . from the simple elevator plant with no return circuit to the very complete, elaborately equipped, highly flexible commercial plant.

All in practical, easy-to-understand line drawings. Simple fact-full tables. Short, snappy right-to-the-point descriptive stories on each.

It takes into consideration the fact that every gravel pit is different; that every deposit varies. It is a *guide*. It gives you today's trends—what's been going on in equipment development. It shows you how to get the most out of your pit—in the most efficient, most profitable way. *It's free!* Ask for Telsmith Gravel Plant Book GP-15.

G C-6-40

SMITH ENGINEERING WORKS, 504 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
81 Binney Street, Cambridge, Mass.
United Steel Sales, Toronto, Ont.

TELSMITH

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Vern Wheeler Eqpt. Co., Columbus, Ohio
Brandeis M. & S. Co., Louisville, Ky.
Charleston Trac. & Eq. Corp., Charleston, W. Va.
Roanoke Trac. & Eq. Co., Roanoke, Va.

MARION FEATU

ARE BASED ON YOUR PR
MATERIAL HANDLING NE

Whether that job calls for a shovel, dragline, clamshell, crane or pull-shovel . . . whether the material to be handled at a profit is rock, shale, clay or dirt . . . Marion machines are designed and built to meet each situation with speed and economy. ● MARION features provide every contractor-user and quarry operator with a well balanced, low maintenance, profitable machine. Watch a MARION in action . . . see it travel . . . check its performance and yardage records. This will convince you your next machine should be a MARION. » » » »

THE MARION STEAM SHOVEL CO.
MARION, OHIO, U. S. A.

MARION

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • PULL-SHOVELS • WALKERS

SELF-CLEANING, NON-CLOGGING CRAWLERS positively will not clog in any material or kind when moving over uneven surfaces.

VACUUM CONTROLLED ROTATING CLUTCHES of the cone type assure safe operation . . smooth setting . . positive contact.

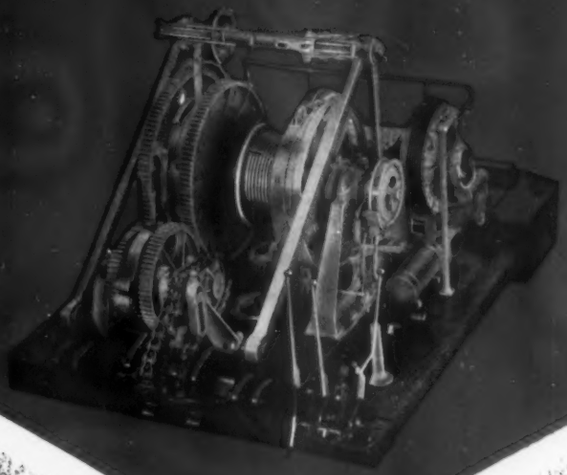
URES

ENT DAY
DS . . .

MODERNIZE with MARIONS

SIMPLE ARRANGEMENT OF GENERAL MACHINERY

Compactness, plus accessibility, ease of maintenance and operating simplicity.



JUST TOUCH THE LEVER AND THE DIPPER TRIPS. Single lever control at the operator's station.

HORIZONTAL PROPELLING SHAFT includes the multiple jaw clutches for controlling the power to the crawler belts and the outside band chock brake that locks the machine against digging thrusts.

EASY STEERING—FAST TRAVEL

Good News for "Early Birds" . . . Special Discount on Copy Arriving Before Oct. 1

Pit and Quarry Handbook offers complete sales coverage for a full 12 months . . . in a year that promises, because of our National Defense Program, to be tops in demand for basic building materials. Catalog your products in this one and only Buyer's Manual of the industry—reach every prospect who authorizes or approves purchases in 6,000 producing plants. Save money—discounts up to 5% for copy arriving before October 1, cash in advance.

PIT AND QUARRY PUBLICATIONS
538 SOUTH CLARK ST. CHICAGO

LeTOURNEAU CARRYALL SCRAPER STRIPS

"CHEAPEST DIRT TO DATE"

at Jesse Allen Lime Company quarry

The LeTourneau Carryall Scraper strips and gets big loads along a one-foot layer of overburden as efficiently as it takes off thirty feet.

Here's the kind of Rooter fragmentation that made cheap "scraper dirt" of limestone outcroppings at the Jesse Allen Lime Company quarry. You'll find LeTourneau Rooter operation just as profitable . . . to eliminate blasting in all but solid rock. Find out, too, how you can add LeTourneau 'Dozing to your Rooter tractor at no extra cost. You'll more than double your savings.

Make your quarry operations more profitable, as the Jesse Allen Lime Company did at Burns, Tennessee. There, when a 9,000-yard bank of red clay had to be removed from a new limestone section, they decided to give this modern LeTourneau Carryall Scraper stripping method a try.

Loading, Hauling, Dumping—One Operation

Right at the start, costly individual loading and hauling operations were eliminated. The 12-Yard Carryall Scraper, working with a "Caterpillar" D8 tractor, dug its own load, hauled to the waste area and dumped in continuous operating cycles. Limestone outcroppings were kept broken with a LeTourneau Rooter for fast, easy Scraper digging. Result . . . "It's the cheapest dirt we've moved to date," reported plant manager Wade.

Here's another money-saving advantage: The LeTourneau Carryall works anywhere in your pit without preliminary rigging of stationary parts . . . handles "odd" jobs, such as road construction and maintenance at no extra cost.

Try the Savings Yourself

Do as scores of successful pit and quarry operators are doing the country over . . . adopt this profit-making LeTourneau Carryall Scraper stripping method. Your LeTourneau and "Caterpillar" tractor dealer will give you convincing job-proof . . . right in your own pit. Ask him to demonstrate . . . TODAY!

R.G. LeTOURNEAU INC

PEORIA, ILLINOIS — STOCKTON, CALIFORNIA

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS* POWER CONTROL UNITS, DRAG SCRAPERS, CRANES, SHEEP'S FOOT ROLLERS, PUSHDOZERS, TREEDOZERS, TOURNAPULLS*, TOURNA-TRAILERS*.

* Name Reg. U. S. Pat. Off.

INTELLIGENT MANAGEMENT— MODERN EQUIPMENT—

The Ohio Marble Company at Piqua has employed both. Jeffrey is proud that our elevators, conveyors and feeders are used exclusively inside the plant.

View at right shows a Jeffrey-Traylor electric vibrating unit feeding to belt conveyor. Rate of feed is infinitely variable from dribble to maximum capacity of plant.

View below shows three Jeffrey bucket elevators *(A)* and six spiral conveyors *(B)* . . . only a portion of such units in this modern plant.

The Jeffrey Manufacturing Company

917-99 North Fourth Street, Columbus, Ohio

QUAKER INDUSTRIAL RUBBER GOODS

QUAKER manufactures a complete line of rubber goods used in and around the plants of sand, gravel, stone, crushed rock, cement and kindred industries.

Progressive Quaker is always alert and keen to make improvements in machinery and equipment; doing continuous research work and experimentation in laboratory, thereby producing Quality Products by careful selection of raw materials, and employing skilled mechanics under supervision of expert executives.

On conveyor belts . . . used so extensively by your industry . . . Quaker builds their belts to stand the hard service which such belts usually encounter. Quaker Belts stay on the job . . . they have what it takes to stand up and deliver volume tonnage at lower cost per ton conveyed.

With Quaker Distributors in all the leading industrial centers stocking Quaker Brands, together with large warehouse stocks in Philadelphia, Chicago, Houston and San Francisco, you can expect and receive quick service.

WHEN RUBBER GOODS ARE NEEDED, SPECIFY QUAKER

QUAKER RUBBER CORPORATION

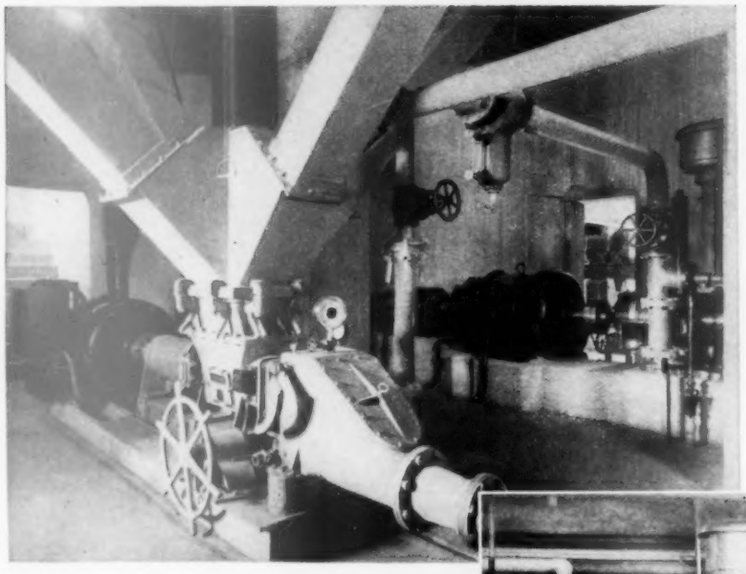
OVER 50 YEARS CONSISTENT QUALITY

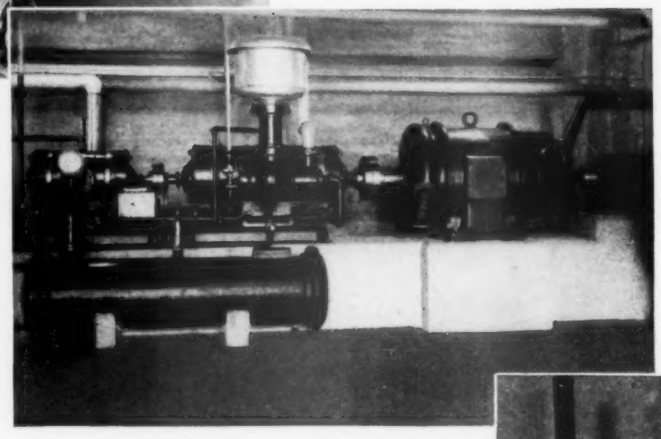
PHILADELPHIA · NEW YORK · CHICAGO · HOUSTON · SAN FRANCISCO

Another FULLER-KINYON PUMP

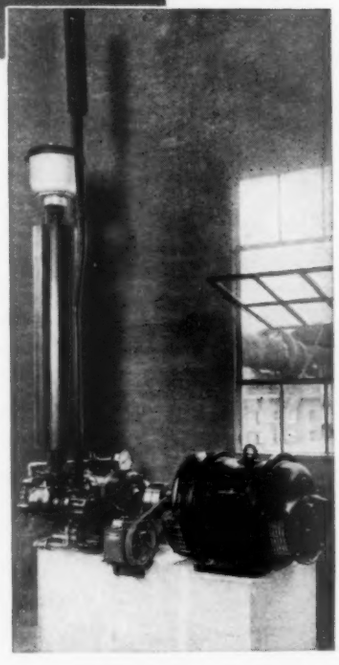
AND

FULLER ROTARY COMPRESSOR INSTALLATION





Above—Fuller-Kinyon Portable Cement Pump for conveying cement from silos to packer bins. Fuller Rotary Single-stage Compressor in background, furnishing air for Fuller-Kinyon Pump. Right—Fuller Rotary Two-stage Compressor furnishing air for Fluxo Conveying System. Lower right—Fuller Rotary Single-stage Compressor, furnishing air for slurry agitation.



ANOTHER Fuller installation, thousands of miles away, attesting to the confidence placed in this equipment to give lasting, trouble-free service and continuous performance day in and day out. In this modern, up-to-date cement plant in South America, Fuller equipment was selected and installed, as follows:

Two 7" Type H Fuller-Kinyon Portable Pumps; conveying cement from silos to packer bins. Also for recirculating.

Two 4" Type H Fuller-Kinyon Stationary Pumps; conveying packer spill to packer bins.

One Two-Stage Fuller Rotary Compressor; air for Fluxo Conveying System.

One Single-Stage Fuller Rotary Compressor; air for slurry agitation.

Two Single-Stage Fuller Rotary Compressors; air for Fuller-Kinyon Pumps.

Of course, Fuller-Kinyon Pumps have long been accepted as standard practice in the cement industry; and now, more and more Fuller Rotary Compressors, due to their inherent characteristics and advantages, are being installed in cement and other industrial plants.

FULLER COMPANY

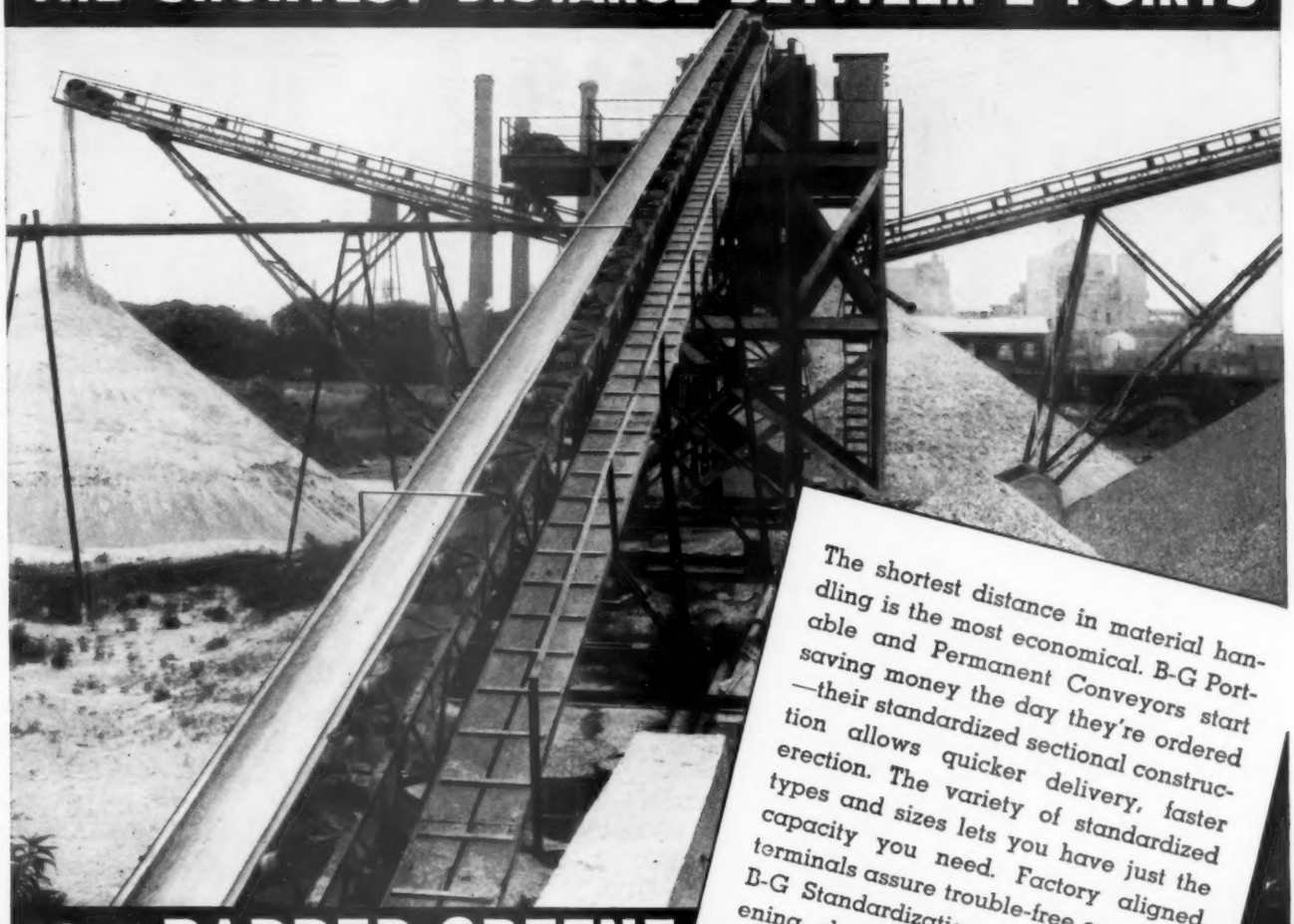
CATASAUQUA, PENNSYLVANIA

Chicago: Marquette Bldg. San Francisco: Chancery Bldg.

G-15

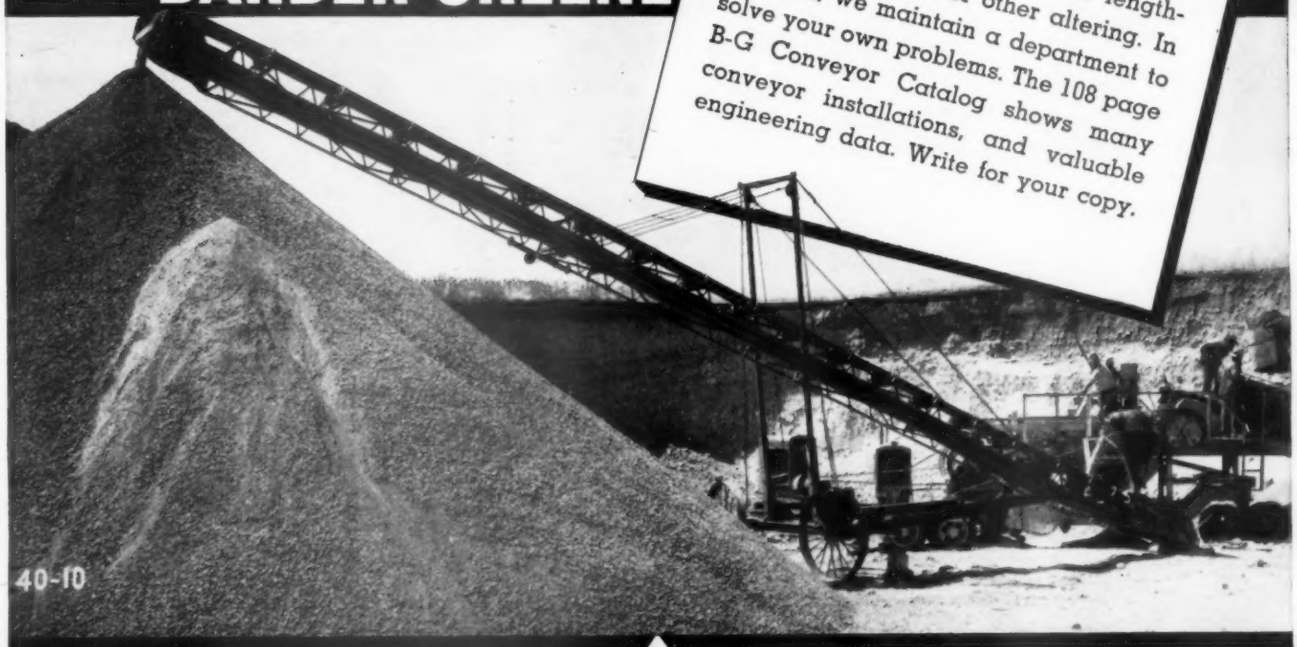
FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS

THE SHORTEST DISTANCE BETWEEN 2 POINTS



IS A BARBER-GREENE

The shortest distance in material handling is the most economical. B-G Portable and Permanent Conveyors start saving money the day they're ordered —their standardized sectional construction allows quicker delivery, faster erection. The variety of standardized types and sizes lets you have just the capacity you need. Factory aligned terminals assure trouble-free operation. B-G Standardization simplifies lengthening, shortening, or other altering. In addition, we maintain a department to solve your own problems. The 108 page B-G Conveyor Catalog shows many conveyor installations, and valuable engineering data. Write for your copy.



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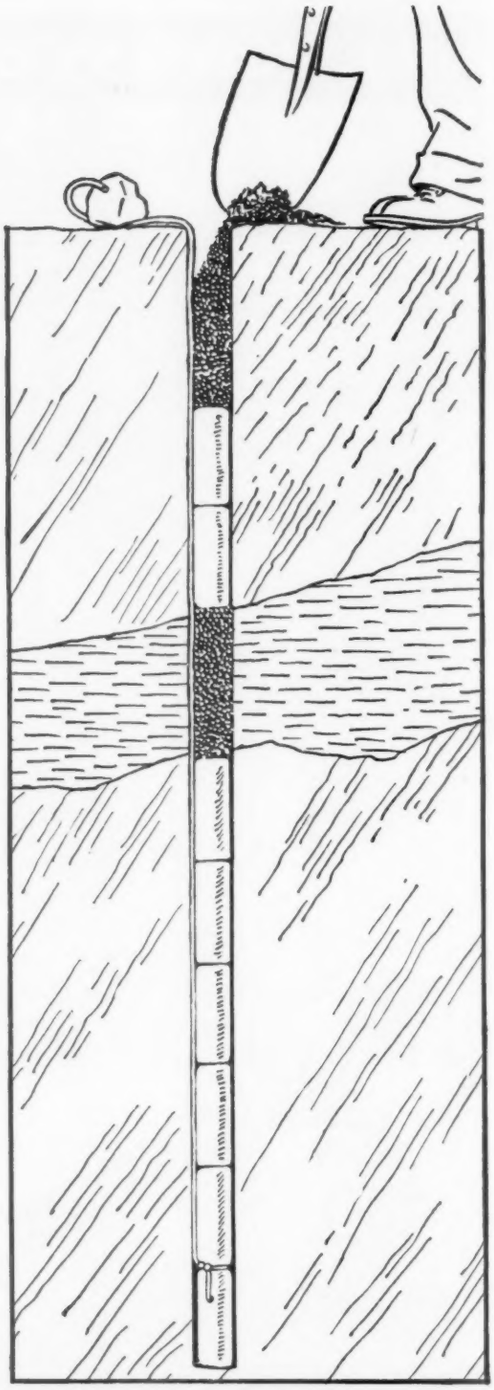
BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS

"STEM" AND TAMP *right*



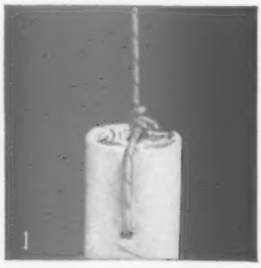
Any explosive does its best work when strongly confined. Stemming material should be free from stones or sharp particles. For deep well-drill holes, dry free-running sand is generally satisfactory. Moist sand, loam, or clay is recommended for shallow vertical holes, jackhammer holes and holes in the face.

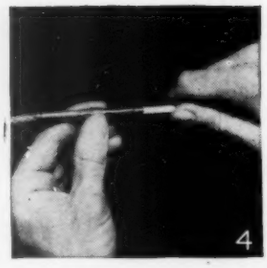
In loading well-drill holes, the Primacord should be cut off the spool and secured with a stone at the mouth of the hole. If stemming material is shoveled into the mouth of the bore hole, be careful not to cut the Primacord with the shovel!

For small holes, the tamping stick should be of wood, with a flat end. Just enough force should be used to press the stemming material firmly into the hole.

Send for the Primacord Booklet—it's free.

Illustration shows a typical deckload, with explosive charge located in the rock and stemming material in the soft strata. Notice that the Primacord is in contact with each cartridge in both loads—no detonators are needed.





PRIMACORD·BICKFORD

Detonating FUSE

THE ENSIGN-BICKFORD CO., Simsbury, Conn.

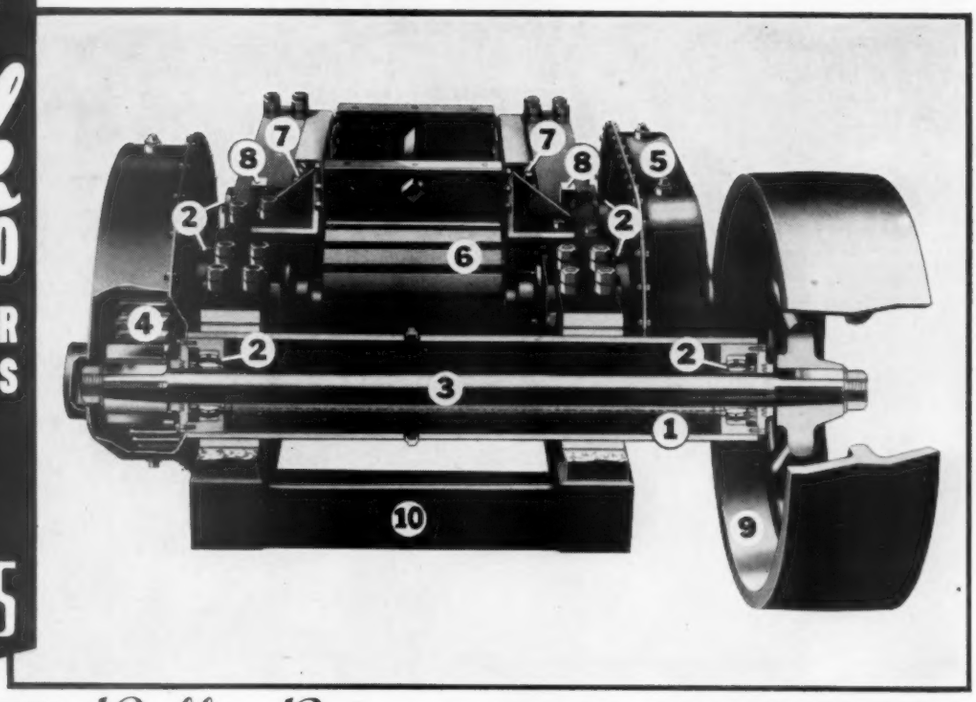
Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

PB24

1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.

IMPORTANT: Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

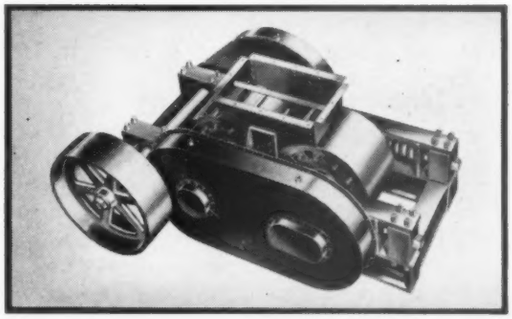
Check THESE 10 SUPERIOR FEATURES of the NEW Cedarapids



HEAVY DUTY *Roller Bearing* ROLL CRUSHERS

MECHANICAL AND STRUCTURAL IMPROVEMENTS MAKE THE Cedarapids LINE THE BEST BUY IN THE INDUSTRY

Referring to the sectional photo above, look at these specifications: (**1**) Tubular steel housing enclosing countershaft and bearing assembly absorbs strain and supports bearings; (**2**) Anti-friction bearings sealed to confine the lubricant and keep out dirt; (**3**) Heavy manganese steel tapered shaft; (**4**) Gear and Pinion drive of cast alloy steel has gear reduction of 6:1; (**5**) Finger Timing Gears of chrome molybdenum steel reduce wear, give smoother performance; (**6**) Roll Shells are mounted on a tapered core held in place by sectional wedges. Shells can be removed without removing bearings; (**7**) Heavy helical chrome vanadium steel wire springs keep proper tension on floating roll. New Cedarapids safety shear plates release tension; (**8**) Shims for adjustment of space between rolls permit adjustments without stopping rolls;(**9**) Large heavy flywheel of cast semi-steel reduces horsepower requirement; (**10**) Welded and riveted I-beam cross braced construction of frame gives a sturdy base without excess weight.



The new Cedarapids Roll Crushers have been designed for greater durability — longer life — more economical performance and lower maintenance cost. Roller bearing Roll Crushers are built in sizes from 16″ x 16″ to 40″ x 24″. Plain bearing Crushers in two sizes — 16″ x 16″ and 24″ x 16″.

GET THIS BOOK!

This book is more than a catalog — it is a manual on secondary crushing, plus complete details about the new line of Cedarapids Roll Crushers. Write for your copy today.

IOWA MANUFACTURING COMPANY ▼ Cedar Rapids, Iowa, U.S.A.

DEALERS IN ALL PRINCIPAL CITIES

Modernize Your Kiln Firing

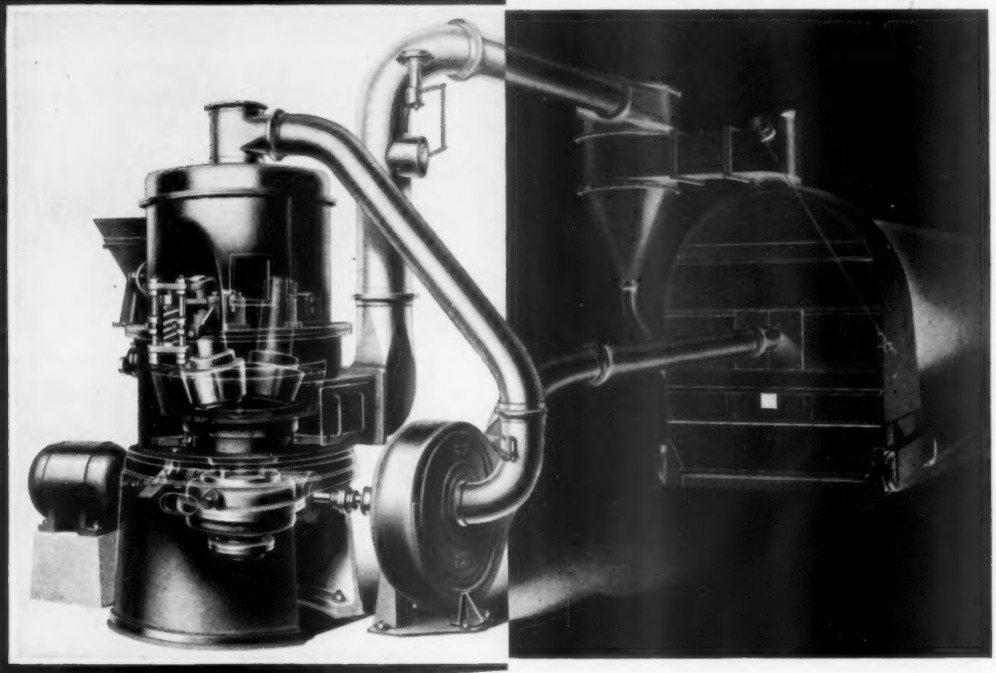
WITH THE RAYMOND BOWL MILL

BOWL MILL

DUSTLESS
Closed system operating under suction

NOISELESS
No metal-to-metal contact in grinding

VIBRATIONLESS
No special foundation nor cushioning pads necessary



THERMOSTATIC CONTROL

For peak efficiency in operation. Panel board includes all controls for pressure, draft and rate of feed and provides complete graphic record of mill performance.

Write for Catalog No. 43

How far advanced in efficiency is this modern direct-firing unit?

The answer comes from actual users who offer their operating records as evidence that total coal preparation costs are reduced 25% or more by the use of the BOWL MILL.

The extra savings over the former equipment often pay for the new installation in less than two years. Important, too, is the proven safety of operation under this modern direct firing method.

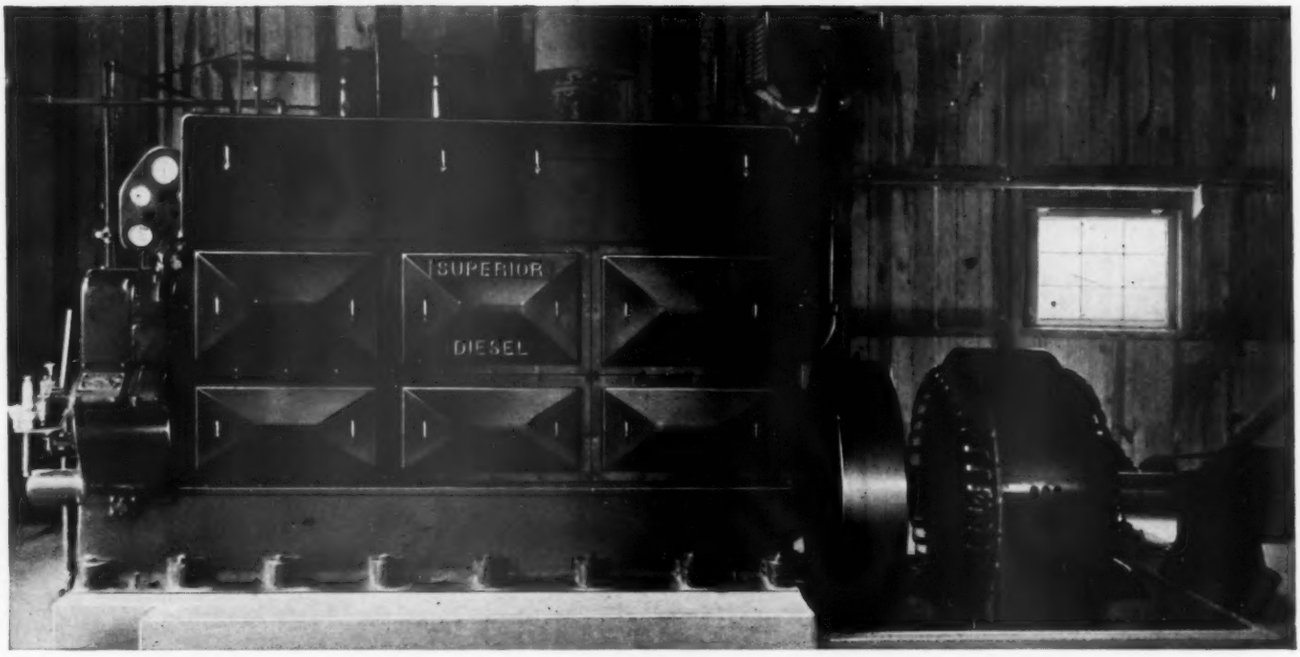
Uniformity of grind, maintained at all feed rates . . . improves burning . . . increases kiln production.

Easy, external adjustments. Self-circulating oiling system.

Built for "marathon service" . . . capable of running entire season without shutdowns.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

DOWN GOES POWER COST 75%



Simple Superior Diesel installation provides all electrical power and lights needed by Howellsville Quarry, Howellsville, Penna.

. . . AND NO DEMAND CHARGES IN WINTER AFTER *Superior* DIESEL GOES TO WORK

Many northern quarries cannot operate all winter and many cannot afford high demand charges for an occasional day or two of operation. That is one good reason for Diesel power.

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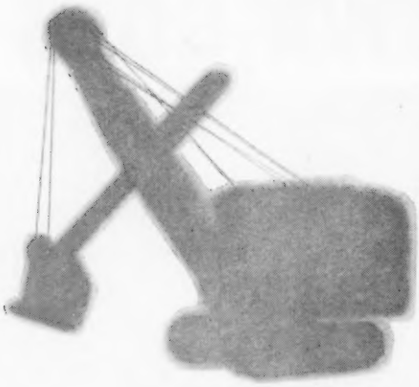
FACTORIES: Springfield, Ohio; Philadelphia, Pa. • SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Cal.; Jacksonville, Fla.; Houston, Texas

It pays to know what you're really getting!



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for making those minus ½ inch sizes

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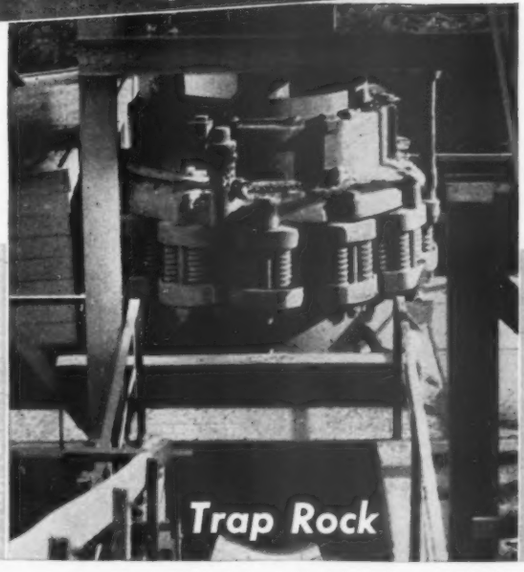
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Making minus half inch material is a field for which the Symons Short Head Cone is primarily adapted. That so many of the larger producers of stone, gravel and slag should standardize on this crusher is evidence of its superiority for this class of work. Producers engaged in making those finer sized materials for black top and other types of stabilized roads will find this crusher exactly suited to their needs. There is no guesswork in the production of these fine materials with Short Heads. Obtain just the sizes you require in quantities that meet your demands and at a crushing cost which will assure of greater profit by doing your fine reduction crushing with a Symons Short Head Cone.

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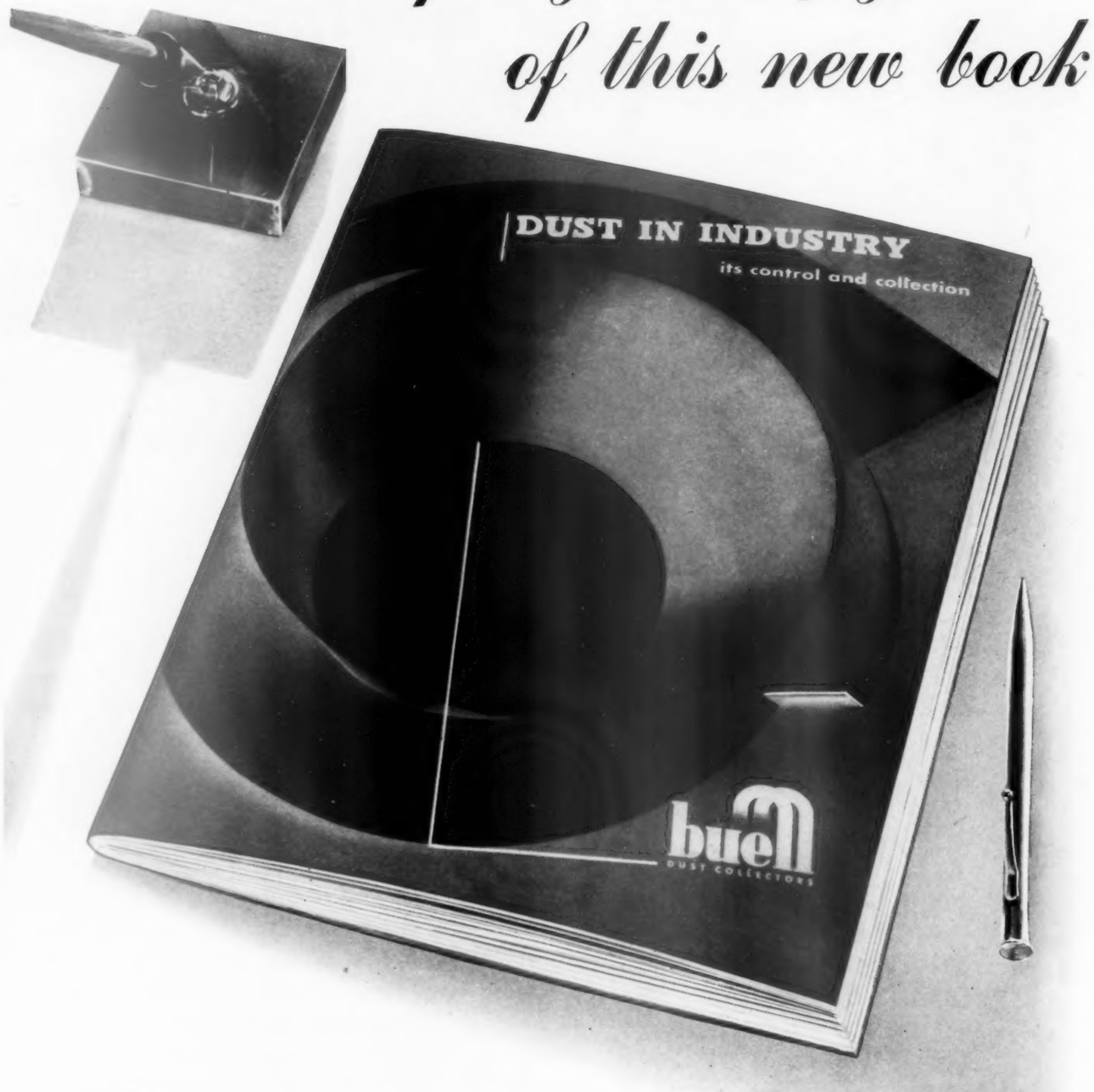

This informative, new 24-page book, "DUST IN INDUSTRY" gets "down to earth" on both the theory and practice of dust collection, cites practical examples, offers many valuable suggestions. A copy will be sent any executive or engineer upon request. Just write BUELL ENGINEERING CO., INC., Suite 5000, 12 Cedar St., New York, or B.F. STURTEVANT CO., Hyde Park, Mass.

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DUST COLLECTORS

PIT AND QUARRY

Vol. 33 SEPTEMBER, 1940 No. 3

CONTENTS

News of the Industry 25
Editorial: Democracy in Danger—I 31
Grinds Coarse Sand to Obtain Fines Demanded by Changing Specifications . 32
Recurring Floods Test Mettle of Portsmouth Gravel Concern 36
Theories (Proved and Otherwise) and Specifications for Portland Cement 37
New Ohio Plant Specializing in Road Aggregates and Metallurgical Stone . . . 41
Salesmen's Reports Give Us a True Picture of Conditions in Our Field 45
Small Indiana Crushed-Stone Plant Has Big-Plant Features 50
Pulverized-Coal Firing of Rotary Lime Kilns . 52
Ann Arbor Operator Builds Plant to Utilize High-Pressure-Steam Curing 75
Pinopolis Dam Concrete Proportioned, Recorded by Automatic Robot Control . . 77
Aggressive Selling Creates a Demand for Lime Putty, Ready-Mixed Concrete . 80
Sells Concrete Brick Through 40 Yards in San Antonio Area 82

Personal Mention 57
Occupational Diseases and the Law 60
Labor Decisions 62
Traffic News Digest 66
New Machinery and Supplies 67

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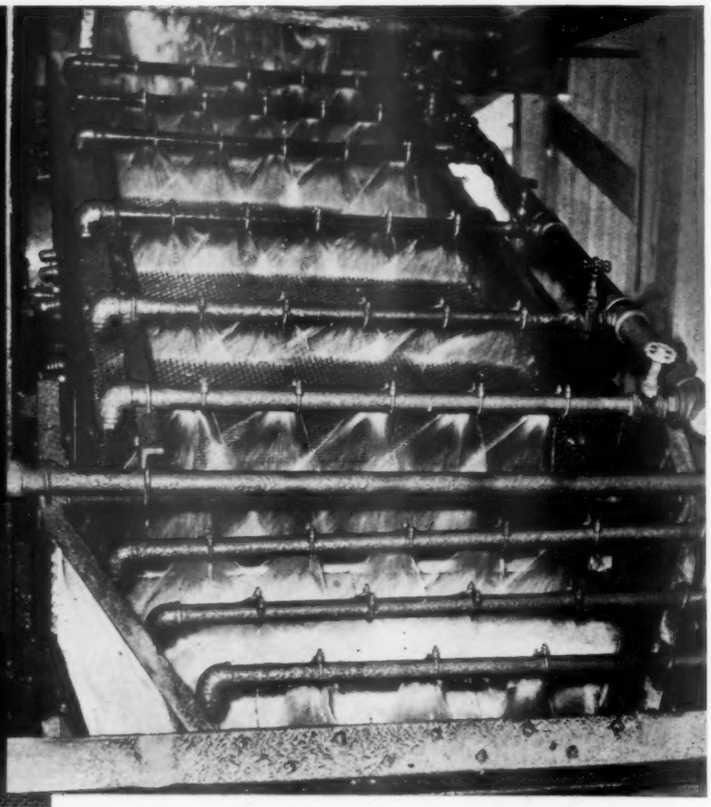

IN THE GRANITE ROCK CO. PLANT AT WATSONVILLE, CALIF.

The huge screen shown under a deluge of water is a 5' x 12' double deck Robins Gyrex. The primary sizing screen shown is also a Robins Gyrex, 5' x 14', three and one half deck. Numerous other Robins Gyrex Screens of various sizes are functioning with their customary efficiency throughout this most modern plant. Operators of both large and small plants will find exactly the screens that best suit their purposes in the Robins line of Gyrex, Vibrex and Eliptex Screens. Send for particulars.

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MATERIAL HANDLING ROBINS EQUIPMENT

ROBINS CONVEYING BELT CO., Passaic, New Jersey

National Gypsum Co. Seeks to Lease Plant of Chemical Lime Co.

The National Gypsum Company of Buffalo will lease the plant of the Chemical Lime Company, Inc., of Bellefonte, Pennsylvania, for 16½ years under a proposal submitted to the Reconstruction Finance Corporation, which has extended loans of $750,000 to the Chemical Lime Company.

The Bellefonte concern, which has assets of approximately $1,700,000, has filed a reorganization plan in the Scranton Federal Court. Under the plan, the Reconstruction Finance Corporation would provide $350,000 more in funds to complete and rehabilitate the lime plant and would take over the property.

Melvin H. Baker, president of National Gypsum, declared his company then would purchase accounts receivable and inventories with $150,000 in preferred stock and lease the plant and lime deposits from the Reconstruction Finance Corporation for the 16½-year period.

The lease would provide for payment by National Gypsum of $80,000 annually. This payment, after deduction of 3 per cent. interest on the $1,050,000 loan, would be used to amortize the loan, which then would be paid off in 16½ years. The National Gypsum Company would have the option during the lease period of buying the property by paying the unamortized Reconstruction Finance Corporation investment.

Miller Named Engineer of Pennsylvania Group

At a recent meeting of the members of the Pennsylvania Sand and Gravel Producers' Association in Harrisburg, arrangements were made to employ as, of August 1, 1940, H. Hershey Miller as resident engineer of the association.

Mr. Miller comes to the association with a wide experience and background in aggregates and materials in general. He was engaged for more than twenty years in the laboratory of the Pennsylvania State Highway Department. More recently he was occupied with materials for the construction of the Pennsylvania Turnpike.

Shipments of Cement at 1939 Level in 6 Months

While Portland-cement shipments for the first six months of 1940 were practically the same as for the same period of last year (53,217,693 barrels in 1940; 53,909,221 barrels in 1939), it is interesting to note that shipments into most states declined 10 per cent. or more, while increases in a half dozen states offset these decreases.

The most notable exception was Pennsylvania where, due largely to the construction of the Pennsylvania Turnpike, shipments for the first half of 1940 were 61 per cent. higher than in the January-June period of 1939, comparative figures showing 2,859,542 barrels shipped into the state in the 1939 period as against 4,594,304 barrels this year. Other states into which increased shipments ranging from 15 to 41 per cent. are noted were: Florida, Georgia, Illinois, Arizona, Nevada and Oregon.

Coming Events

October 7-11, 1940—Chicago. Annual Safety Congress, National Safety Council, Stevens Hotel.

October 10-11, 1940.—Washington. Mid-year board meeting, National Sand & Gravel Association, Willard Hotel.

January 15-17, 1941—Cincinnati. Annual conventions, National Sand & Gravel Association and National Ready Mixed Concrete Association, Netherland-Plaza Hotel.

Pacific Coast Cement Makers Want Lower Rate to Canal Zone

Pacific Coast cement manufacturers have sent an appeal to California's Governor Olson for help in their campaign to secure government-owned freight service to the Canal Zone, as a means of securing rate parity with the East Coast. The present cement freight rate from California to Panama is $7 per ton, against $4 from New York via government-owned vessels of the Panama Railroad Line.

"California and other Pacific Coast shippers are unable to secure any service to the Canal Zone flying either the American or foreign flags that will meet the delivery schedules required by the Panama Canal Commission," said the letter to Governor Olson.

The situation is of particular importance to the entire Pacific slope, since the government is about to begin its $277,000,000 program of building a third set of locks across the isthmus.

Basic Dolomite Adds Two Rotary Kilns

Two rotary kilns are being installed in the $275,000 addition to the plant of Basic Dolomite, Inc., near Tiffin, Ohio. The kilns will produce "Basifrit," a dead-burned magnesite clinker, and other magnesitic refractories.

A short time ago the company erected a $125,000 plant for manufacturing a new line of plastic, cementing and ramming basic refractories.

New York Gravel Plant Suffers $10,000 Damage

About $10,000 damage resulted in a fire which partially destroyed the plant of the Hornell Gravel Corporation near Allegany, New York, recently.

Sparks from a grinding wheel flying into a pail of gasoline are believed to have started the blaze.

New Building Given Impetus by Defense Program Contracts

Construction contracts awarded during the month of July in the 37 eastern states amounted to $398,673,000, according to F. W. Dodge Corporation. The increase over July, 1939 was 33 per cent. and the increase over June of this year was 23 per cent. Private construction contracts increased 19 per cent. over July 1939, and public construction contracts (reflecting the beginning of awards under the defense program) increased 50 per cent.

Most conspicuous in the increased volume of private construction were commercial and manufacturing buildings and single-family houses. The latter class of project, which has been running very strong from the beginning of the year, is making 1940 the largest residential-building year since 1929.

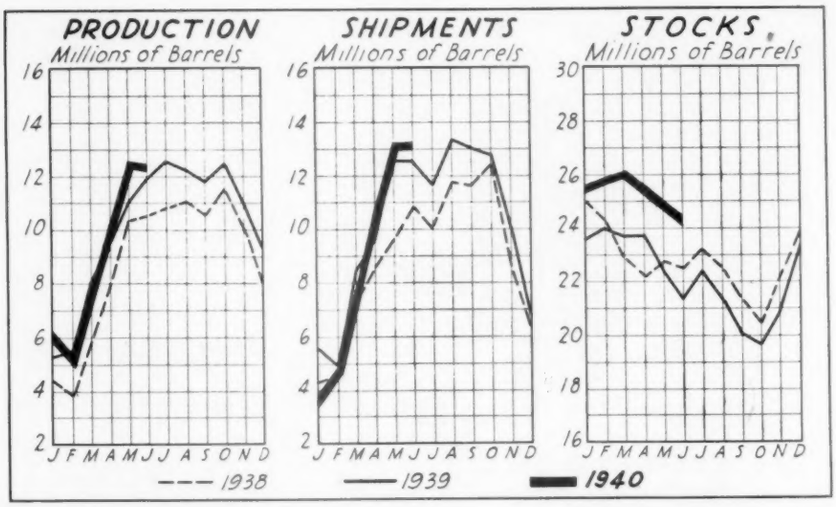
The large July increase in total contracts put the accumulated volume of all construction started from the first of the year one per cent ahead of the accumulated total for the first seven months of 1939. While private construction has forged ahead during the preceding months, its gains up to July 1 were more than offset by declines in public construction. Thus the preparedness program includes a volume of construction that has begun to replace the public-works programs of former years.

Must Pay 1½-Time for Work Over 42 Hours

Supplements to Interpretative Bulletin No. 4 of the Wage and Hour Division dealing with "constant-wage" plans, calculating overtime pay, etc., have been mailed to members of the National Sand & Gravel Association and the National Industrial Sand Association by Executive V. P. Ahearn.

The new interpretations point out that hours worked overtime in any week must always be paid on a 1½-time basis, they may not be balanced against short work-weeks to avoid overtime payments, and employees on a regular weekly or monthly salary must be paid the required 1½-time rate for hours worked in excess of 42 (or 40, after October 24, 1940) despite the fact that they are regularly paid when absent on holidays, vacations, during illness, etc.

The Guaranteed Gravel & Sand Company of Mankato, Minnesota, has gone into the ready-mixed-concrete business.



The Portland-cement industry in June, 1940, produced 12,514,000 barrels, shipped 13,216,000 barrels from the mills, and had in stock at the end of the month 24,076,000 barrels of cement, according to the Bureau of Mines. Production and shipments showed increases of 4.7 and 3.9 per cent., respectively, as compared with June, 1939. Portland-cement stocks at mills were 12.0 per cent. higher than a year ago. Operations were at 58.9 per cent. of capacity compared with 56.4 per cent. in June, 1940. These statistics are compiled from reports for June received by the Bureau of Mines from all manufacturing plants.

EMPLOYMENT AND PAY-ROLLS
(Compiled for PIT AND QUARRY by Isador Lubin, Commissioner of Labor Statistics, U. S. Dept. of Labor.)

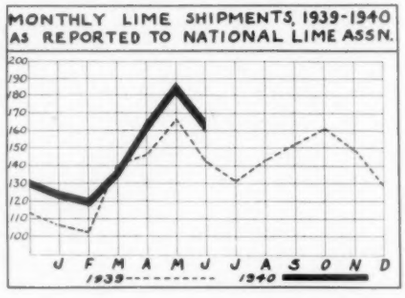
Industry	Establishments	Number of Employees	Pay Rolls (1 week)
Cement:			
May, 1940	139	21,789	$605,346
June, 1940	139	22,291	611,129
Percentage change		+2.3	+1.0
***Quarrying and non-metallic mining:**			
May, 1940	900	30,234	688,333
June, 1940	900	30,738	697,112
Percentage change		+1.7	+1.3

*Preliminary.

Maker of Insulation Makes Peace with FTC

The Eagle-Picher Lead Company and its subsidiary, Eagle-Picher Sales Company, Cincinnati, have entered into stipulations with the Federal Trade Commission in which they agree to cease advertising that all insulation using paper as a base, or that insulation such as that sold by their competitor, Insul-Wool Insulation Corporation of Wichita, Kansas, is inflammable or that its thermal conductivity compares unfavorably with that of rock wool or is higher than that of sawdust.

The respondents further agree to discontinue claims that insulation having a paper base is susceptible to moisture or will settle when properly placed in the stud of a building. The respondents also stipulate that they will cease representing, through the use of excerpts from newspapers concerning a fire which occurred at the plant of a competitor, that the material which was burned was the finished product, when in fact, the burned material was only raw material which had not been placed in the completed form in which it was customarily sold by the competitor in the usual course of trade.



According to data collected by the National Lime Association, 72 companies in June, 1940, shipped 159,017 tons (93,398 quicklime; 65,619 hydrate). Reporting companies represent 51.7 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 308,000 tons. Shipments of lime by use and grade for June, 1940, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	2,737	14,570
Building	24,436	32,637
Chemical	67,225	18,412
Total	93,398	65,619

Break Ground for New Texas Gypsum Mines

Ground was broken recently near Hockley, Texas, for the first shaft to the new gypsum mines of the Texas Gypsum Mining & Construction Company of Houston.

This new concern expects to produce about 1,000 tons of crude gypsum per day after the mine is opened and a $300,000 plant is completed. Products will include 200,000 square feet of fiber board daily, according to D. S. Culbertson, one of the executives of the company.

Revise Interpretation of Wages and Hours for Truck Drivers

Executive Secretary V. P. Ahearn of the National Sand & Gravel Association, has mailed to members Interpretative Bulletin No. 9 as revised by the Wage and Hour Division.

The revised bulletin refers to a decision by the Supreme Court of the United States in the American Trucking Association case, wherein it was held that authority of the Interstate Commerce Commission to prescribe maximum hours of service for common and contract carriers did not go beyond employees directly concerned with the safety of operation of motor vehicles. The Commission is presently engaged in determining what employees of common and contract carriers other than drivers are engaged in such activities.

In the original Interpretative Bulletin, the Wage and Hour Division appeared to take the position that until the Interstate Commerce Commission exercised its power to control hours of employment of drivers employed by private motor carriers, such employees came under Section 7 of the Federal Wage and Hour Law. No effort was made to enforce such an administrative policy, and it appears to have been abandoned in the new Interpretative Bulletin. Whenever an employee, in any part of a given work-week, engages in the transportation of goods for a private motor carrier in interstate commerce, his hours of work are subject to the jurisdiction of the Interstate Commerce Commission. For the present the Division is taking the position that only drivers of private motor carriers are exempted, but the way is left open for a later order of the Interstate Commerce Commission exercising authority over other employees of private motor carriers if they are discovered to have a direct influence over safety of operation.

Orders Cement Company to Cease Violations

The Hy-Test Cement Company, Philadelphia, has been ordered by the Federal Trade Commission to discontinue certain practices in violation of the Federal Trade Commission Act.

Commission findings are that the respondent, for the purpose of promoting the purchase of its products, published from time to time the results of cement tests made by the National Bureau of Standards, and identified all masonry cements used in such tests. The findings continue that the respondent, one of the companies participating in the tests, violated the established understanding between the Bureau and participants in the tests that such tests were of a confidential nature, were for the purpose of improving the mortars tested, and the results were not to be used for sales promotion.

The Commission's order prohibits the respondent from divulging or assisting the purchasing public in determining the identity of the manufacturer or the brand name of any cement which was tested by the Bureau of Standards of the United States Department of Commerce, the results of which tests were published with cements tested listed under code or symbol numbers by the Bureau of Standards in "Research Paper 683, A Study of the Properties of Mortars and Brick and Their Relation to Bond."

The order further prohibits use by the respondent for sales promotional purposes, of any report by a United States agency, where use of such report is violative of any regulation issued by the agency, or where such use implies that the agency has approved or recommended the use of respondent's products.

Quarry Workers Groups Merge; Wage Increased

Two C.I.O. quarry-workers' union groups were merged at a meeting in Akron, N. Y. They are Branch 273, Quarry Workers' International Union of North America, comprising employees of the Phoenix Gypsum Company, Oakfield, New York, and Branch 278, comprising Certain-Teed Products Corporation employees of the Akron plant.

It also was announced that Branch 278 has signed a new contract with Certain-Teed officials. It calls for a 2½-cent blanket wage increase for all employees, higher increases for certain employees, one week's vacation with pay, and time and a half for overtime. The contract affects 225 employees in the Akron plant.

Bowsman Gravel Erects $60,000 Hot-Mix Plant

The Bowsman Washed Sand & Gravel Company of Piqua, Ohio, has erected a $60,000 hot-mix aggregate-bituminizing plant at Urbana, Ohio, on the property of the American Aggregates Corporation. It is reported to have a capacity of 1,000 tons of asphaltic material per day, and when operating at capacity keeps about 20 trucks busy.

Aggregates are purchased from the American corporation. The Bowsman concern has contracts for several large highway jobs in the vicinity.

Shipments of Gypsum Products Show Rise in Second Quarter

The brisk trade in the gypsum industry was sustained at a higher level during the April-June period of 1940 than in the same period of 1939; the overall improvement being indicated best by the 8- and 12-per cent. gains, respectively, in the tonnages of apparent crude supply and calcined gypsum produced. Sales volumes of gypsum products, as reported by producers to the Bureau of Mines in the second quarter of this year, showed gains over 1939 in all major classifications, with outstanding increases noted for sales of agricultural gypsum, industrial plasters, and lath.

Sales of uncalcined products, composed chiefly of raw gypsum for Portland-cement retarder, were in the aggregate, 14 per cent. higher than for the same period of 1939. All classes of industrial plasters showed increased sales volumes in the second quarter of 1940 and, as a group, the tonnages sold were 19 per cent. greater than in the similar period of last year.

The striking gain made in sales of gypsum lath over those in the April-June quarter of 1939 continued the strong uptrend that has persisted since 1934. For the first 6 months of 1940, lath sales were nearly one-fourth greater than in the first half of 1939.

Petoskey to Install Generating Equipment

The Petoskey Portland Cement Company, according to an announcement by John L. A. Galster, president, will spend $138,000 this winter installing additional generating equipment in its power plant.

Contracts have been signed for a 3,500-kilowatt turbine generator which will be ready to operate in April of next year. The cement company uses both plant-generated and public-utility power.

Protest Closing of WPA Crushing Plant

City and county officials at Toledo are protesting a W.P.A. order suspending stone-crushing operations which have been carried on for some time in quarries of the France Stone Company, whereby stone was obtained for 85 cents per ton for road work, using W.P.A. labor.

The suspension of work was ordered because the W.P.A. felt that the question of competition with private industry was involved.

Record Sand Cargo Transferred to Ship at Canal Terminal

The biggest cargo of sand ever loaded into a lake freighter at the State Barge Canal Terminal in Buffalo was transferred from barges to the steamer *A. M. Byers* recently. The record shipment—9918 tons—was taken from 17 barges in four fleets which had been arriving at the terminal for more than a week.

It took more than 40 hours to transfer the sand from the barges to the holds of the 504-foot steamer. All three of the floating cranes for loading and unloading at the terminal were used in the transshipment, one of the rare occasions when all of them were used on a boat at one time.

The molding sand was loaded into barges in Mechanicsville and Catskill and was taken by the *Byers* to the Kohler Company, plumbing supply manufacturer, in Kohler, Wisconsin.

Production Resumed at Rock-Wool Plant

Operations have started at the plant of the Clifty Rock Wool Company north of Campbellsburg, Indiana, after a thorough reconditioning.

The company produces its own electric power.

Capacitors Decrease Reactive Power Demand

Using capacitors to correct power factor from 0.57 to 0.95 saves the Louisville Cement Company (of New York), Akron, New York, less than 1 per cent. on its bill for electric energy, but cancels charges for reactive power demand. This saving is large enough to pay for the capacitors in about 3 years.

Voltage regulation was so bad before correction of power factor that induction motors on machines in the main tunnel of the company's cement-rock mine could not be started without boosting by hand, which required several men, even when running-voltage levels were satisfactory. After connecting three banks of Westinghouse capacitors at various points along the 440-volt feeder system, effective current-carrying capacity was increased by some 15 per cent. and voltage regulation was restored to satisfactory operating limits.

Capacitors installed in the mine.

RECENT GOVERNMENT CONTRACTS FOR MATERIALS UNDER THE PUBLIC CONTRACTS (WALSH-HEALY) ACT[1]

Date of Delivery 1940	Supplier	Government Agency	Commodity	Amount
12/31	Whitehall Cement Mfg. Co., Cementon, Pa.	W. P. A.	Portland cement	$85,820.00
11/30	Independent Gravel Co., Joplin, Mo.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	Concho Sand & Gravel Co., Inc., Oklahoma City, Okla.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
10/31	New York Trap Rock Corp., Tompkins Cove, N. Y., Clinton Point, N. Y., Haverstraw, N. Y.	W. P. A.	Broken stone	17,980.05
10/31	Otis Sand & Gravel Co., South Orange, N. J.	W. P. A.	Crushed stone	16,690.20
10/31	Limestone Products Co., New York City	W. P. A.	Bituminous Mixture	11,061.70
Indef.	Stone-Mix Concrete Corp., Buffalo, N. Y.	W. P. A.	Ready-mixed concrete	10,000.00
10/31	Whitehall Cement Mfg. Co., Cementon, Pa.	W. P. A.	Portland cement	32,520.50
10/31	Whitehall Cement Mfg. Co., Cementon, Pa.	W. P. A.	Portland cement	32,968.50
Indef.	Standard Gravel Co., Jackson, Miss.	W. P. A.	Clay, gravel	14,200.00
11/30	American Limestone Co., Knoxville, Tenn.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	Dolcito Quarry Co., Birmingham, Ala.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	Willingham-Little Stone Co., Atlanta, Ga.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	Campbell Limestone Co., Gaffney, S. C.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	Dermot Shemwell & Sons, Albany, Ga.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
Indef.	Superior Portland Cement, Inc., Seattle, Wash.	Procurement	Portland cement	Indefinite
Indef.	Colorado Portland Cement Co., Denver, Colo.	Procurement	Portland cement	Indefinite
6/30/41	The Barrett Lime Quarries, Inc., Cincinnati, O.	War Engineer Corps	Riprap	59,000.00
12/31	Billings Truck Co., San Diego, Calif.	Naval Supply Depot	Crushed rock and sand	21,000.00
6/28	Whitehall Cement Mfg. Co., Cementon, Pa.	W. P. A.	Portland cement	41,896.12
6/30/41	General Builders Supply Corp., New York City	W. P. A.	Portland cement	25,190.00
11/30	Dolcito Quarry Co., Birmingham, Ala.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	Gager Lime Mfg. Co., Sherwood, Tenn.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite
11/30	American Limestone Co., Knoxville, Tenn.	Agriculture, Purchase, Sales and Traffic	Ground limestone	Indefinite

[1]"Indefinite" refers to indefinite contract; purchases to be made as and when needed.

Establishes Truck Line to Handle Aggregates

The Red Rock Gravel Company, headed by W. R. Lutz, has established headquarters at Smith Center, Kansas, to engage primarily in the transportation by motor truck of sand, gravel, crushed stone, and other materials.

The company has set up rigid standards for its fleet and operating personnel and is authorized to operate in interstate and intrastate service. It hopes, through the high standard of service it has established, to eliminate the "wildcat," or "gypsy" type of trucking operator.

Three Share Friant Dam Contracts for Cement

Sharing contracts totaling $1,535,794 with two other plants, the Pacific Portland Cement Company of Redwood City will supply 412,500 barrels of cement for construction of the Friant Dam on the San Joaquin River in California.

The Friant Dam will be the fourth largest concrete dam in the world when completed, and will require 2,200,000 cubic yards of concrete. Pouring of concrete began in August.

Also supplying cement are the Calaveras Cement Company, 800,000 barrels, and the Yosemite Portland Cement Company, Merced, 437,500 barrels.

Johns-Manville Workers Take Military Training

More than 110 Johns-Manville employees in various plants and offices left on August 5 for three weeks military or naval training in connection with the government's national defense program, company officials announced recently.

In accord with Johns-Manville's basic policy to support national defense by full co-öperation with Army, Navy or Marine Corps authorities in the training of reserve or inactive personnel, the company will make up the difference in pay between what the government pays these men and what they would have earned if they had remained at work.

Files Civil Action Against Six Gypsum Firms, 8 Officials

The U. S. Department of Justice filed a civil action in Federal court at Washington on August 16 against six corporations which produce and distribute gypsum building products and against eight officers of the companies. The suits, like similar criminal proceedings started in June against five of the companies and nine individuals, charge violation of anti-trust laws.

On June 28 a special Federal grand jury returned two indictments charging illegal control of resale prices of certain purchases of gypsum board and use of an allegedly invalid patent to fix prices illegally on perforated gypsum lath.

The following defendants were named in the latest action:

United States Gypsum Company, National Gypsum Company, Certainteed Products Corporation, Celotex Corporation, Ebsary Gypsum Company, Newark Plaster Company; Samuel M. Gloyd, Texas Cement Plaster Company; Sewell L. Avery, chairman of the board of directors of the United States Gypsum Company; Oliver M. Knode, president of United States Gypsum Company; Melvin H. Baker, president of National Gypsum Company; Bror G. Dahlberg, president of Celotex Corporation and chairman of the board of directors of Certainteed Products Corporation; Henry J. Hartley, president of Certainteed; Frederick G. Ebsary, president of Ebsary Gypsum Company, and Frederick Tomkins, president of the Newark Plaster Company.

The government, it was said, will seek to have the court decree that the patent-licensing agreements between the defendant companies are in violation of the Sherman act. It also seeks cancellation of all provisions of these agreements which give the licensor power to fix prices on products made by its licensees, and which provide for payment of royalties on patents not used by them or on products not listed within the licensing agreements.

Strike Closes Missouri Portland-Cement Plant

The Missouri Portland Cement Company's plant near Kansas City was closed, beginning August 10 following a walkout of 84 union employees in support of a demand for a closed shop. The plant will remain closed until union representatives come to an agreement with company officials at St. Louis, Missouri, F. Schulzke, plant manager, reported.

Company officials said a contract signed last January 19 between the company and the United Cement, Lime and Gypsum Workers International No. 27, an A. F. of L. affiliate, provides there shall be no strikes or lockouts during the term of the agreement, and does not include a closed-shop clause. Union representatives said it would be a violation of the contract to work with the 16 non-union employees at the plant.

George E. Henson, Independence, an employee of the plant, was charged with assault with intent to kill, when he allegedly fired a revolver at union employees who attempted to stop his motor car as he drove from the plant.

Death Takes Carrozzo, Foe of Ready-Mix

Mike Carrozzo, boss of more than a score of construction labor unions in Chicago, died August 4.

Carrozzo had successfully kept ready-mixed concrete out of Chicago until recently, when bids were called on transit mixed for street paving. The ready-mixed concrete ban is now under investigation in connection with U. S. Deputy Attorney General Thurman Arnold's probe of the building and construction industries. The federal government also claimed Carrozzo evaded income-tax payments on his alleged huge income for the past several years.

Short Weight Brings Fine in Milwaukee

Gravel will continue to be furnished to the city of Milwaukee by the Druecker-Kaestner Company with the requirement that a weight ticket from a certified scale be submitted for each load, it was decided recently by the city purchasing board.

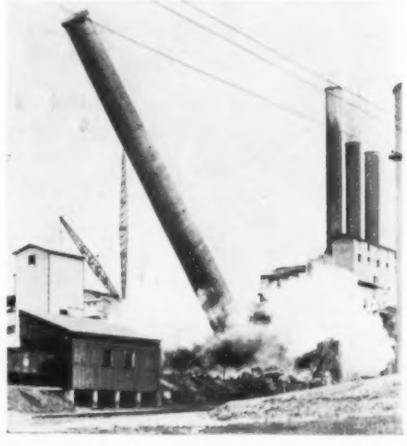
This action was taken by the board after a Druecker-Kaestner Company driver admitted in court he delivered a load June 26 which had not been weighed and which was found to be about 3,000 pounds short when checked. The driver was fined $25.

A Correction

The kiln charts (Figures 9 and 10) in the fifth article of a series by Dr. Robert W. Rothrock on *Performance Measurement and Mechanical Control* (*P&Q*, June, 1940, pages 37-40) were furnished through the courtesy of F. L. Smidth & Company and should have been so credited.

The McGrath Sand & Gravel Company, Lincoln, Illinois, has applied to the War Department for permission to erect a loading dock on the Illinois River at Chillicothe, Illinois.

Although still in good condition, it recently became necessary to remove the 200-foot reinforced-concrete stack erected in 1909 at the Hudson, New York, plant of the Universal Atlas Cement Company to make room for further additions to this plant which is being completely rebuilt. The stack was almost completely surrounded by buildings and other structures and there was only one place for it to fall without damage to other structures. Note portion of stack blasted out near bottom and holes drilled for loading with dynamite.



Actually, the stack fell almost with mathematical accuracy, falling as a single piece with only one transverse crack in the middle until it struck the ground.

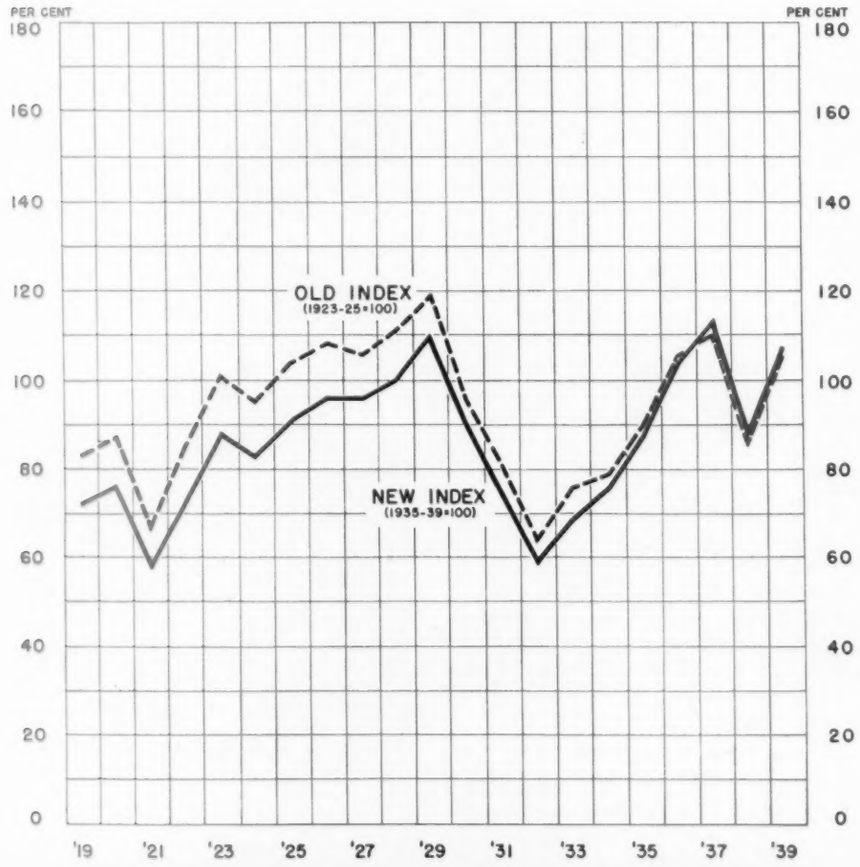
The steel reinforcing bars showed no deterioration, indicating that moisture had not penetrated the concrete. To all appearances, the concrete was in excellent condition. Tests are now being made of the 30-year-old concrete. The kilns shown were operating during the entire wrecking procedure.

CURRENT BUSINESS INDICATORS

In the short space of two months national defense not only has become a foremost nationwide topic of conversation but also has replaced the war abroad as the most important single force in our industrial life. Under this new orientation the American businessman looks to Washington rather than abroad for information on which to formulate policies regarding production schedules and inventories. Of course a smashing German victory over England would disrupt the flow of materials abroad and render impotent the back-log of British orders. It is admitted that this might cause a definite break in business, but probably only temporary, for the defense program seems to be large enough to absorb virtually all orders that might be diverted from shipment abroad. Despite this apparent optimism regarding the immediate business situation it must not be overlooked that the ultimate effects of the collapse of England would be far-reaching and not so easily disposed of.

Much has been written regarding the magnitude of the defense program and the construction that will be necessary in expanding industrial facilities to meet the deluge of orders. Actual expenditures, however, seem to be delayed in some instances awaiting action by the Congress on the liberalization of present amortization tax requirements to allow manufacturers to write off the costs of plant expansion out of earnings during the next five years. The Department of Commerce has estimated that the national-defense program will require an expenditure of two and one half to three billion dollars in 1941 for plant expansion and new equipment. Comparable data for earlier years have never been compiled, but estimates, also by the commerce department, indicate that in eight years of the past twenty, such expenditures have amounted to about two billion dollars.

Uncertainty over amortization legislation certainly has not held up all construction, especially in the aviation industry. The *Wall Street Journal* has reported that aircraft manufacturers were about ready to begin $150,000,000 of new construction. Actual announcement of several big projects related to the defense program was made about the middle of August; they included $20,000,000 for a new Douglas aircraft factory in Southern California, a $20,000,000 tank factory in the Detroit area, and a $25,000,000 powder plant near Radford, Virginia.



FEDERAL RESERVE INDEX OF INDUSTRIAL PRODUCTION

The Federal Reserve Board has just announced a completely new index of industrial production covering manufactures and minerals. It supersedes the board's former index and differs from it chiefly in that it is broader in scope, covering many new statistical series, and is calculated on an up-to-the-minute base period, 1935-1939 average. Of particular significance is the fact that the new index, because of its broader scope, shows less erratic short-term fluctuations. In general, the level of the new index falls below the old in the earlier years and is slightly above it since 1937. (See accompanying chart).

The new statistical series (production unless otherwise noted) included in the revised index that were not in the old index are machinery, aircraft, railroad cars, copper deliveries, lead and zinc shipments, furniture, common brick, face brick, glass containers, rayon deliveries, manufactured dairy products, other manufactured foods, alcoholic beverages, chemicals, rubber consumption, and gold. Of these, only common brick, face brick, and glass containers bear any relation to nonmetallic minerals. In fact, of all the series included in the index, only cement and polished plate glass in addition relate to nonmetals. This may seem like an omission to those who are directly concerned with sand and gravel, crushed stone, and the like, but when it is realized that stone, clay, and glass products are weighted as only 3 per cent. of the total index, the apparent gap is not especially significant.

In both June and July the board's revised index stood at 121 per cent. of the 1935-39 average, and it is expected that industrial capacity in August was maintained at above the same rate. This is 17 points above the level prevailing a year ago before the outbreak of the war in Europe. Steel production in July was at about 85 per cent. of capacity, but it was stepped up to around 90 per cent. in August. Except for the automobile industry, where plants were closed to prepare for the shift to new models, production of all types of machinery and equipment remained at high levels.

The present outlook for business is definitely bright, although the increasing national debt is thought by many to cast an ominous shadow on the future. Particularly encouraging has been the steady increase in employment over the past few months.

EDITORIAL

Democracy in Danger—I

WHEREVER democracy has been set up and has had the earnest support of liberty-loving people its principles have been exposed to the threats of reactionary movements. It is one of the weaknesses of democracy, as well as one of its strengths, that its principles lay it open to attacks which would not be tolerated by any other political philosophy. In asserting its dependence on the theory that thought and its expression should be free, it provides its opponents with the opportunity for easy attack and the channels through which antagonistic ideas can approach and even take possession—though for the most part only temporarily—of the thought processes of the individual. The willingness with which democratic doctrine accepts the challenge of contradictory philosophies evinces a courage which other political theories can not match. The fact that democracy has for so long successfully withstood the assaults of criticism, both well-intentioned and ill-conceived, is the best evidence that could be offered of its basic soundness as a plan for living. Widespread belief in this truth makes us tolerant of all opposition, perhaps unduly tender of ideas that run counter to the principles in which we believe, yet ever ready to extend to others the same rights of unrestricted thought and utterance which we have demanded for ourselves.

This tolerance, laudable as it is as an expression of our strong sense of justice, logical as it may be as a declaration of reasonable thinking, may easily degenerate into complacency, an easy-going confidence that the principles of democracy, having once been established and accepted by us, are self-protecting, self-renewing, self-perpetuating. These principles have become, through training and experience, such an indispensable part of our mode of life that many of us have lost an awareness of their value, validity and importance which should not for even a moment escape us. Too many Americans are in that state of political apathy which borders on indifference and makes it easy for subversive attacks on it to make headway almost unobserved. Most Americans who read, who listen to the radio, who hear platform speakers, expose themselves more frequently and more dangerously than they will ever fully realize to the crafty, unscrupulous and thoughtfully-planned propaganda that finds ready channels of expression under our tolerant protection. With the principle of such tolerance we have no quarrel; but with the mental tranquility, the childish gullibility, with which many of us accept its false doctrines we have little patience.

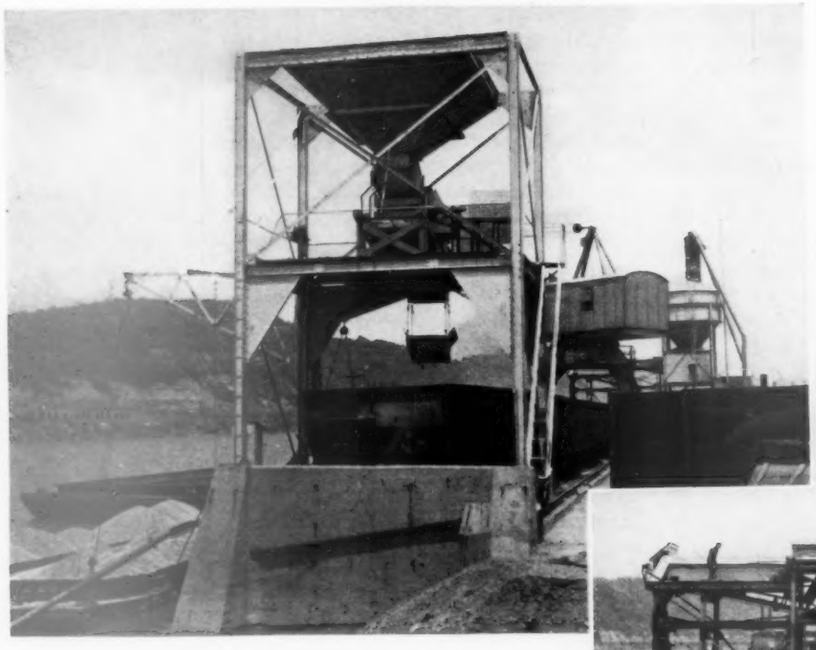
History mentions no greater, no more cruel, no more bitter or devastating critic and enemy of democracy than the man whose cowed and deluded hordes infest the land, sea and air of the eastern hemisphere, whose fanatical followers in other continents seek to sow the seeds of internal dissension, family discord and political strife as the forerunners of decay and dissolution in the few places where democracy still prevails. Writing in *Mein Kampf* of the weaknesses of parliamentary government, he says in part: "The internal composition of a group of these five hundred representatives, measured according to profession or abilities of the individual, gives a picture that is as confused as it is pitiful. For one can not expect that these elected ones of the nation are also the elect of intellect or even of common sense! . . . One can not contradict too sharply the absurd opinion that men of genius are born out of general elections. First, there is only one real 'statesman' once in a blue moon in one nation and not a hundred or more at a time; and second, the masses' aversion to every superior genius is an instinctive one. . . . The most important economic measures are brought before a forum, while only one-tenth of its members can evidence any economic training. . . . " [Questions] "will always be decided by a majority of ignoramuses and incompetents, since the composition of this institution remains unchanged, while the problems to be dealt with extend to nearly all fields of public life. . . . They would all have to be universal geniuses, such hardly as come forth once in centuries. . . . They are not all 'heads', but narrow-minded, vainglorious, and arrogant amateurs, an intellectual *demi-monde* of the worst kind. From this there often results the inconceivable carelessness with which these gentlemen discuss and decide on affairs which would give even the greatest minds cause for careful reflection. Measures of the greatest importance for the future of an entire state, even of a nation, are taken, as though a hand of *Schafkopf"* [sheep's head—a card game popular in Germany] "or *taroc* . . . were before them and not the fate of a race."

This has a shred of truth and a present-day aptness. In the time during which our Congress has debated the propriety of conscription the writer of those words overran and conquered a nation of 42,000,000 people. While we discuss the pros and cons of releasing overage destroyers to Great Britain, he could master half a continent. While we listen attentively and perhaps none too critically to the appeasements pleas of a stunt flyer suddenly turned political counsellor, Hitler's paid agents confuse and distract us with the false preachings of a violent anti-Semitism, the mischief-making diversions of anti-Communism, anti-trade unionism, anti-interventionism, and the like. While we quibble over the details of war profits and plant-amortization plans, the proponent of a theology dedicated to the brotherhood of man preaches race hatred and social injustice. While we dawdle over the question of making the National Guard readily available for emergency action, 50,000 more young fighters are added to a military organization that has not yet met its equal. While we wax eloquent over the threat to individual liberty involved in the adoption of conscription, we overlook the loss of all our liberties that will inevitably follow the triumph of the philosophy of destruction which casts its shadow over the world. While we mince words and sniff at problems "like a cat at a bowl of hot mush", thousands of Westricks, Vierecks, Zitters, McWilliamses, Coughlins, Fords, Lindberghs, Olivoes, Browns, Sparlings, and Stewarts work unceasingly, some deliberately and some unwittingly, toward destroying the principles on which our American life is founded.

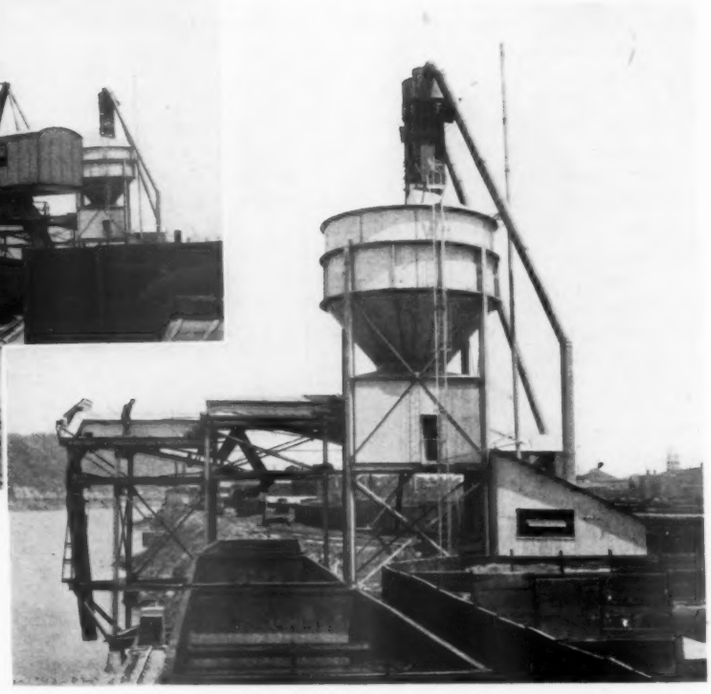
The society of Hitler's future, what will it be like? "There will be a *Herren*-class," he told Rauschning, "an historical class tempered by battle, and welded from the most varied elements. There will be a great hierarchy of party members. They will be the new middle class. And there will be the great mass of the anonymous, the serving, collective, the eternally disfranchised, no matter whether they were once members of the old *bourgeoisie,* the big land-owning class, the working class or the artisans. Nor will their financial or previous social position be of the slightest importance. These preposterous differences will be liquidated in a single revolutionary process. But beneath them there will still be the class of subject alien races; we need not hesitate to call them the modern slave class. And over all these will stand the new aristocracy, the most deserving and the most responsible *Führer*-personalities."

There is the end of democracy, of everything you have cherished, everything you have striven for, everything you have hoped and planned for, everything you have set aside and stored away. Should that day arrive, Hitler may well say again, "The day of individual happiness has passed."

Grinds Coarse Sand to Obtain Fines Demanded by Changing Specifications



LEFT: The movable hopper and screen for rewashing gravel is in foreground. The gantry crane and pulverizing plant are in background. BELOW: The pulverizing plant with car-and-barge-loading conveyors at left.



By W. E. TRAUFFER

THE growing insistence of governmental agencies that sand used in concrete construction must contain a specified percentage of material finer than 100-mesh has added to the many problems facing producers. In the area in and around Pittsburgh it has been especially difficult to meet these specifications because most of the local river sand contains less than the required percentage of this size. As a result Pittsburgh producers had to resort to heroic measures at a cost to them of many thousands of dollars.

Officials of the Iron City Sand & Gravel Company, one of the largest producers in this area, studied several alternative methods of meeting this situation before deciding on the present plant and method. It was felt that crushing some of the gravel in order to obtain the fine dust of fracture for addition to the natural extreme fines was not justified because of the limited, though growing, market for crushed gravel. The method chosen consists of reducing by grinding some of the excess coarser fractions of sand to the finer fractions desired. This method gives accurate control of the finished product, which varies considerably in its gradation but hardly ever contains enough fines to meet the specifications.

The various government specifications vary slightly but are in general as follows:

3½	to 8	per cent. passing	100-mesh
15	to 30	per cent. passing	50-mesh
45	to 80	per cent. passing	16-mesh
95	to 100	per cent. passing	4-mesh

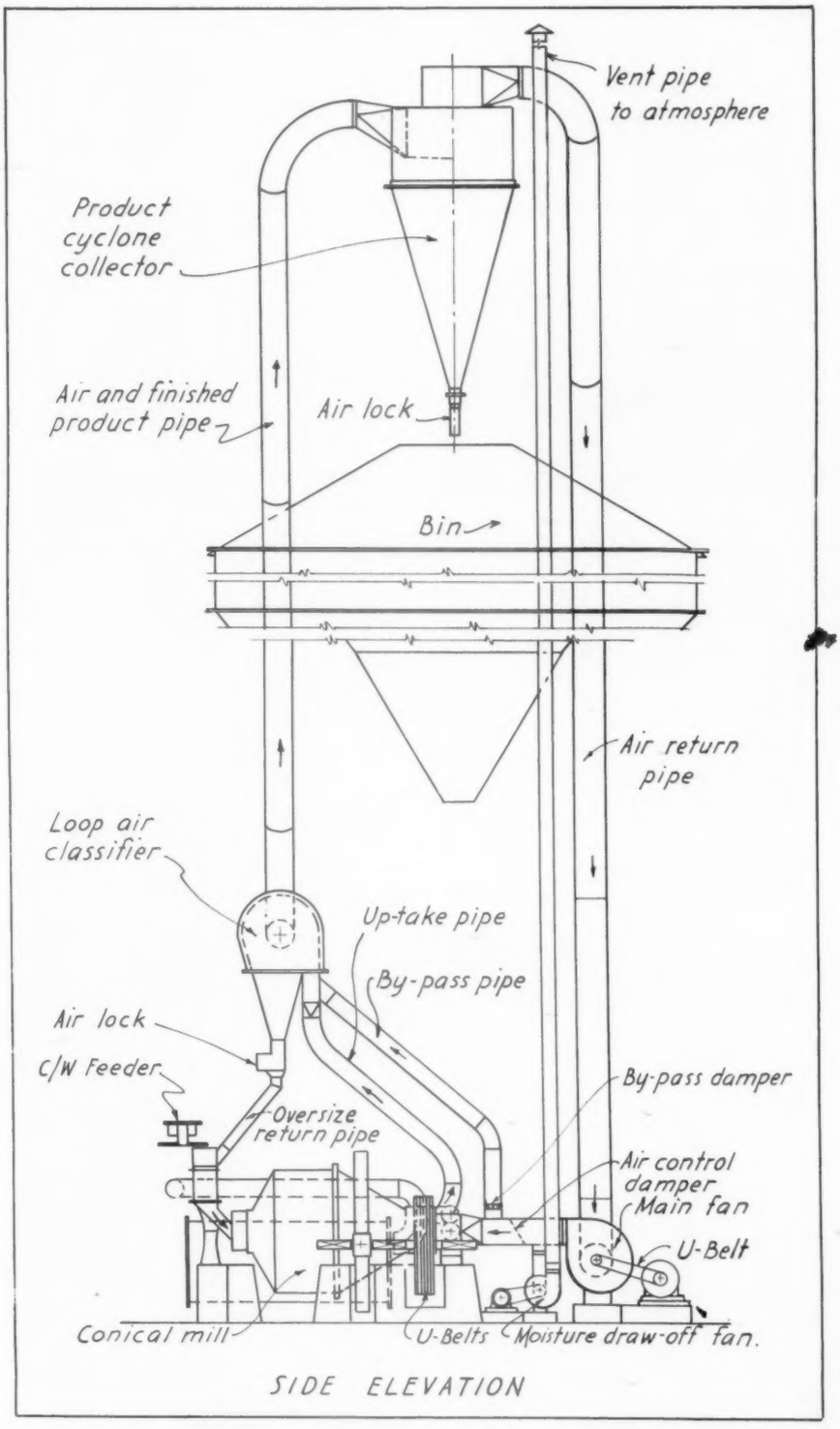
The river sand processed in the plant varies considerably in the different fractions but averages about as follows:

1	to 2	per cent. passing	100-mesh
10	to 14	per cent. passing	50-mesh
68	to 74	per cent. passing	16-mesh
94	to 96	per cent. passing	4-mesh
	100	per cent. passing	⅜-inch

It is evident from the above analyses that the addition of a few per cent. of minus 50-mesh material containing considerable minus 100-mesh material is needed to bring about the desired balance. A plant designed to do this was put in operation in March, 1940 at the company's yard at 43rd Street and the Allegheny River. In this plant a small percentage of the raw river sand is diverted through a grinding circuit in which it is also dried. The dried pulverized material is then added in the desired proportion to the raw sand. This process makes possible the production of specification sand without wasting any of the raw material.

Sand in each barge-load received is carefully tested for gradation and a certain portion is taken out, ground and recombined with each load in the required percentage. Tests are made of cars loaded for shipment and these consistently show the blending to be perfect.

The minus ¼-inch sand is unloaded from the barges by a Dravo whirley gantry crane with a 2½-cubic yard clamshell bucket. This crane is mounted on wheels on wide-gage tracks between which is the loading track which serves not only the new plant but also the aggregate-storage bins at this yard. The sand is fed to one of the two 200-ton compartments of the circular Blaw-Knox steel bin over the pulverizing plant. A Blaw-Knox sliding gate in the side of the conical bottom of this bin controls the feed of sand to the grinding circuit. The sand goes through a 12-inch diameter pipe to a Hardinge 3-foot diameter revolving table-feeder. This feeds the sand into the 6-foot by 36-inch Hardinge conical ball-mill.



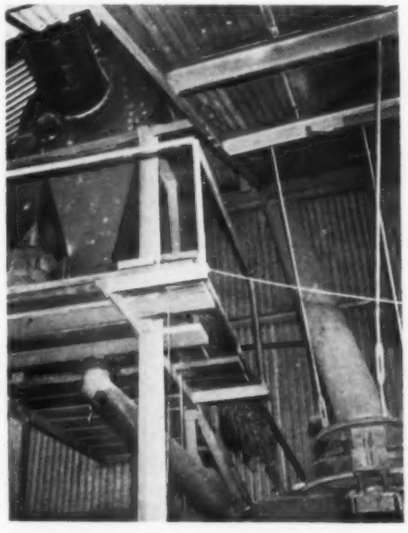
This elevation view of the grinding circuit shows the flow of air and materials.

The rate of feed to this mill is controlled by a Hardinge "electric ear", a photoëlectric-cell device which has been described several times in these pages. The "ear", a special type of microphone, is installed under, and within a few inches of, the conical part of the shell at the feed end of the mill. The volume of the sound of the grinding balls dropping on the mill shell actuates the control-box mechanism, which speeds up or slows down the ¼-horsepower Dayton gearmotor driving the feeder. According to company officials, this "electric-ear" control keeps the mill at its maximum efficiency at all times and eliminates the manual feed control which required the full time of an operator to even approximate maximum efficiency.

The Hardinge conical mill has manganese-steel liner plates and is loaded with 3,000 pounds of 2-inch manganese-steel grinding balls, 6,000 pounds of 1¼-inch balls, and 3,000 pounds of ⅞-inch balls. The ball wear averages about ⅜ pound for each ton of pulverized output. Operating in connection with the mill is a Hardinge 4-foot by 10-foot cylindrical furnace fired by a York rotary burner using Gulf Solar fuel oil. Two Brown temperature controllers in the mill circuit automatically regulate the feed of oil to the burner. One of these, on the hot-air pipe going to the mill is set for a maximum of 900 degrees F. The other controller is on the pipe between the mill and the main fan and is set for a minimum of 230 degrees F.

The main fan and duct with moisture draw-off fan at lower right.

The hot air from the furnace is drawn into the mill-feed pipe below the feeder. Most of this air, with the product of the mill, is drawn through a collecting cone and an uptake pipe to a Hardinge 45-inch lined loop air-classifier above the mill. The "rejects" from this classifier, plus 50-mesh, are returned to the feed end of the mill through an air-lock. The finer material is carried with the air to a 6-foot diameter Hardinge cyclone separator at the top of the plant. A balanced air-lock



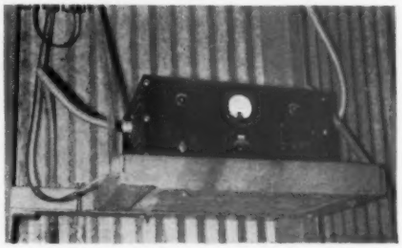
The loop air-classifier and its piping are at left. At right are mill-feed pipe and table-feeder.

on this separator allows the discharge of the minus 50-mesh finished product with little air loss. This product is discharged into the second 200-ton compartment of the bin already described. This compartment is roofed over to keep the material dry.

The air is drawn from the separator into the No. 17 Clarage fan which motivates the entire circuit. This fan blows the air into the feed end of the mill between the shell and the discharge cone. This air creates reversing air currents inside the mill and comes out with the material through the cone. It is at this point that some of the mixture of hot drying air and recirculated air is drawn off for recirculation through the furnace. In the pipe between the fan and the mill is a connection to a No. 7 Clarage vent-type moisture draw-off fan which also replaces air lost in the circuit. Dampers control the flow of air to this fan, to the mill, and to the furnace. Water-glass indicators connected to these points show the relative pressure balances which control the circuit.

The finished product of the grinding circuit has the following average analysis: 100 per cent. through 16-mesh, 88.1 per cent. through 50-mesh, and 66.1 per cent. through 100-mesh. The average capacity is about 3 tons per hour. The moisture content of the product approximates zero when it is discharged into the bin but this increases to as much as 5 per cent. in storage.

The next step in the process is to blend the dry pulverized sand with raw sand to meet the specifications. Raw sand is withdrawn from its 200-ton bin compartment by means of a Size C Hardinge constant-weight feeder. Although this is an adjustable feeder, it is operated at a set speed, all variations in



The control box of the "electric ear" which regulates feed to mill.

blending being made by adjusting the fine-sand feeder.

Considerable experimentation was necessary before satisfactory control of fine sand feed was obtained. This very fine dry sand has a tendency to arch and at other times to flood through the feeders. The method now being employed successfully includes the use of a special paddle-type agitator of the company's own design. Below and above it are aërating nozzles. This agitator is driven by a small gearmotor.

Foundry Supplies Company electric vibrators are attached to the sides of the bin. With these it has been found possible to keep the sand flowing freely and steadily in any kind of weather. The rate of feed is controlled by a Size B Hardinge constant-weight feeder. The graduated weight-bar on this feeder is set for the desired rate, which usually varies between 2 and 4 per cent. of the weight of the raw sand. Both feeders are equipped with compensating balanced rubber belts, no-load cut-offs, and revolution indicators which are used for occasional checks of their capacities.

The two types of sand are discharged in two thin, flat converging streams into a hopper with baffle plates which effect a preliminary mixing. The finished sand is discharged on a 30-inch by 27-foot inclined belt-conveyor feeding a selective split chute equipped with baffles for further mixing. Through one leg of the chute the material drops through a flexible spout into open-top railroad cars on the loading track. The other leg feeds a 30-inch by 20-foot belt-conveyor from which barges are loaded through a long swinging spout.

All shipments have been made in cars. A 60-ton car is loaded in an average of about 35 minutes.

The plant building is of all-steel construction with steel-sash windows, etc. An Ingersoll-Rand tank-mounted compressor supplies air for agitation, cleaning motors, etc. The mill is driven by a 75-horsepower motor through a 7-

The conical mill and drive. In background are the mill-feed pipe and the loop air-classifier with its ducts.

Constant-weight feeders blending pulverized sand (left) and raw sand (right) on loading belt-conveyor.

The 22nd Street and Monongahela River yard with gravel crushing and screening plant at right extending under bridge.

strand V-belt drive. The main fan is driven by a 30-horsepower motor and the small fan by a 10-horsepower motor, both through V-belts. Both belt-conveyors are driven by Dayton gear-motors. Texrope V-belts and Republic conveyor belts are used.

At the same yard the company recently installed a portable unit for re-washing gravel before it is loaded into

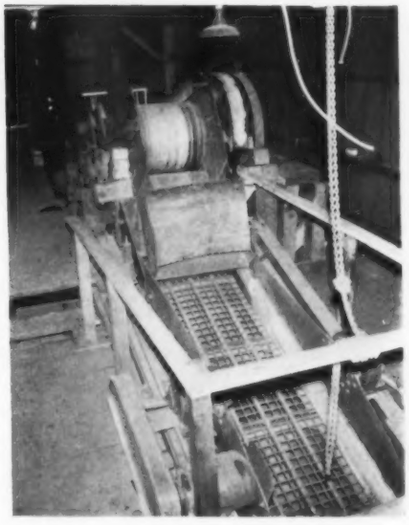
Another view showing conical mill and its connection to loop air-classifier.

cars for shipment. The traveling crane previously described unloads all the raw materials from barges and stores them in partitioned ground-level bins from which it later loads them into cars or truck-loading bins. The washing unit consists of a steel hopper which is movable on wheels on the gantry track and feeds a 3-foot by 8-foot Telsmith vibrating screen equipped with Deister Concenco washing sprays. This hopper can be moved into position near any desired bin or over any car and can also be used to wash aggregates loaded direct from barges into cars.

One of the problems arising in the use of this method was the necessity of supplying wash water to the screen at any location. A 4-inch header pipe from a pump at the river bank was laid parallell to the crane track. Hunt "Quick as a Wink" couplings installed at 6 points on this line make possible quick connection to the water supply.

Another trend in specifications which has created a problem for producers in this area is the growing insistence that the soft stone in gravel be kept under a certain percentage. The new state highway department specifications require that gravel show less than 35 per cent. loss in 500 revolutions in the Los Angeles rattler test. This company has just completed the installation of equipment for this purpose at its yard at 22nd Street and the Monongahela River.

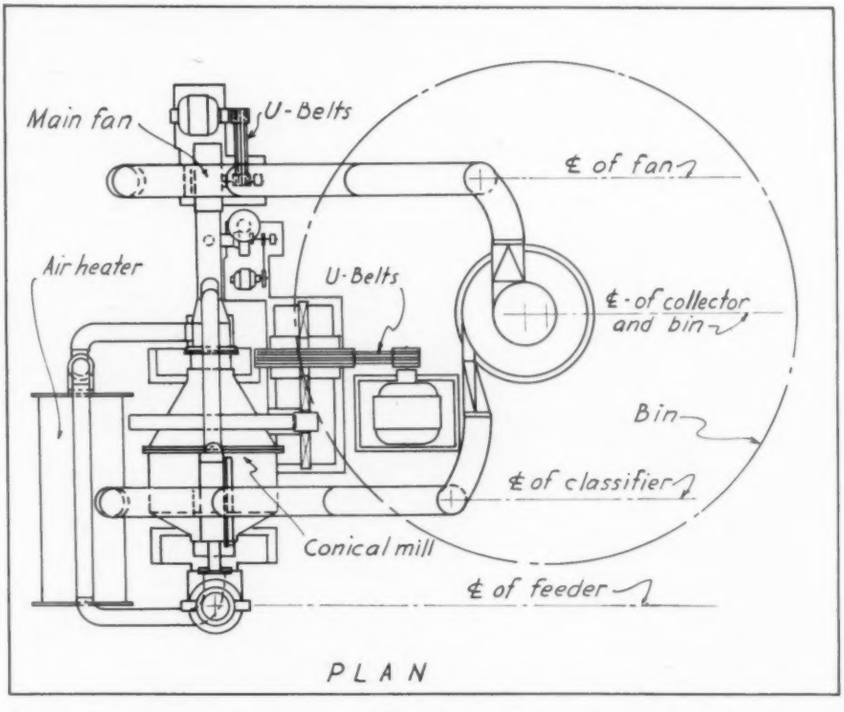
At this plant gravel will be unloaded from barges into a hopper under which is a Dandridge reciprocating feeder. Gates over an impact-type crusher



View of belt-conveyor feeding crushed gravel to screen.

are so arranged that any desired percentage of the gravel can be fed to the crusher and the remainder by-passed. In order to meet the specifications an average of about 40 per cent. of the gravel is being crushed. The crushed and by-passed materials are recombined

(Continued on page 51)



Plan view of the grinding circuit which clearly shows small area occupied by this equipment.

Recurring Floods Test Mettle of Portsmouth Gravel Concern

The bituminizing plant and office are in right foreground. In background is the gravel plant and its storage trestle.

THE business of producing sand and gravel is believed by many to involve great risks because of the many factors which can affect it adversely. When to the normal hazards are added the destructive effects of exceptional flood conditions the production of sand and gravel is seen to be largely a sporting proposition.

The Portsmouth Sand & Gravel Company of Portsmouth, Ohio, since 1916 has operated successfully in the face of constant flood threats. Its plant is located on a high bluff overlooking the Scioto River just above its confluence with the Ohio River, a spot of great scenic beauty.

Sand and gravel are dredged from the Scioto River which fluctuates rapidly between very high and very low levels. The screening and storage plant is located on the top of the bluff, 60 feet above normal river level and apparently safe from any flood. When the existing flood wall was built to the 62-foot level all danger from floods was thought to have been eliminated. The 67-foot flood of 1913 was regarded as a freak which could never happen again. The record flood of 74 feet in 1937 then upset all previous calculations, inundating the entire city. The plant office was completely submerged and much damage was done to the plant and stock-piled materials. Even a 40-foot flood submerges the receiving hopper and shuts down the plant.

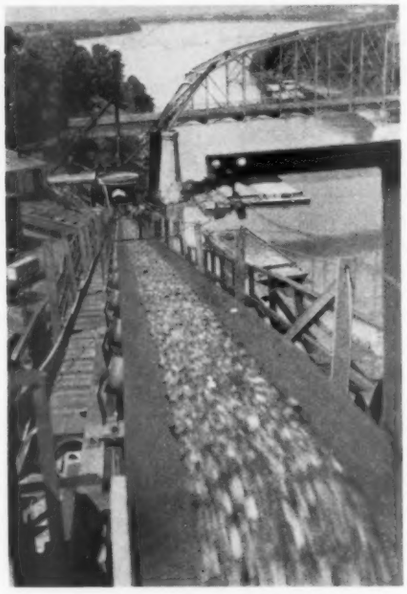
Now a 77-foot flood wall is being built and aggregates for it are supplied by the company. A $1,000,000 housing project under way in Portsmouth also takes much of the plant's output.

The plant has not been changed much since it was built and has a daily output of about 750 tons of gravel and 250 tons of sand. The dredge is equipped with a 10-inch Amsco pump, rotary and flat screens, and washers. The oversize material is wasted. Sand and minus 2½-inch gravel are loaded separately into barges. Tow-boats haul the loaded barges to the plant dock where a stiff-leg derrick with a 2-cubic yard clam-shell bucket transfers the aggregates to the plant hopper. A skip car on an incline was formerly used to carry material to the plant. This was recently replaced by a 350-foot inclined belt-conveyor on the same framework. A Cincinnati conveyor belt is used.

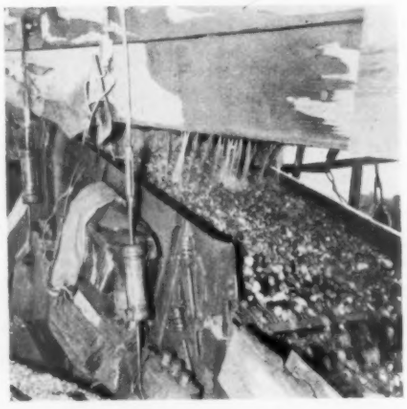
An old Traylor electric vibrating screen does the final gravel sizing and easily handles the entire output. The various sizes of gravel produced drop into bins from which they can be loaded.

Stock-piling is done with a car on a trestle which is loaded at the bins and discharges into several piles. This car is pulled up the 7-per cent. slope by an International gasoline engine and hoist and is returned by gravity. A dry-batch bin was recently installed so that trucks can be loaded from storage when high water shuts off the main belt.

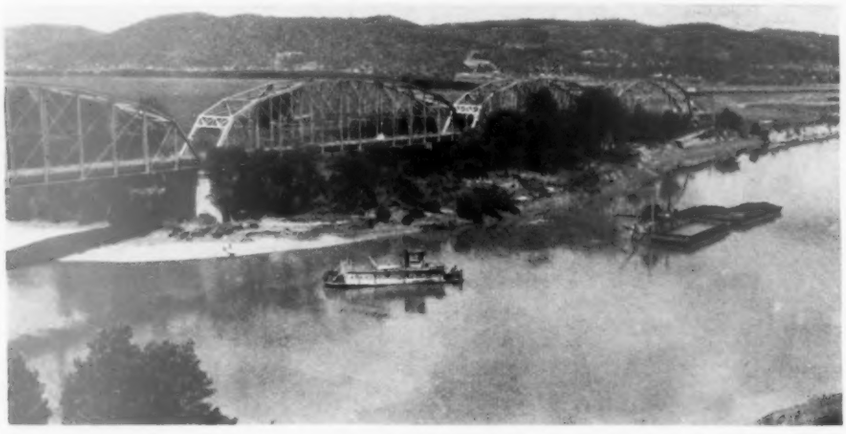
The company also produces bituminized aggregates in a Farasey plant which was purchased in 1937.



The main conveyor from hopper which is fed by derrick from barges.



The electric vibrating screen which does all final washing and sizing.



This view taken from the plant shows the Scioto River at near normal level with the dredge, barges and tow-boat.

Theories (Proved and Otherwise) and Specifications for Portland Cement*

By P. H. BATES
Chief, Clay and Silicate Products Division, National Bureau of Standards

THE word "cement" is sufficiently indicative and well enough understood to enable practically all to assert it to be a bonding material. But "Portland" fails to be a leading word and enlightening enough to permit one to make an intelligent guess. . . . In reality one can not define Portland cement in the manner used by writers of dictionaries. The possible best that can be done is to refer to it as largely a mixture of finely ground synthetic highly basic lime silicates with which are present lesser amounts of highly basic lime aluminates, lime alumino-ferrates, and solid solutions of these with (or compounds of) the many adventitious oxides found in clays, limestones, and the other raw materials used in cement manufacture. The chemical analysis of this heterogeneous powder must show it to be within certain specified chemical limits. It must also be capable of reacting with water to form a bonding agent able to meet certain specified physical tests. Needless to say this "possible best" definition is quite inadequate. . . .

The work of Le Chatelier is conspicuous in that, with what would now be considered rather inadequate observations and data, he indicated that the major constituents of cement were those that much refined exacting work has since confirmed. He prepared tricalcium silicate ($3CaO \cdot SiO_2$) and believed it to be the only essential constituent that contributed to the hardening of cement. He also prepared dicalcium silicate ($2CaO \cdot SiO_2$), tricalcium aluminate ($3CaO \cdot Al_2O_3$) and other lime aluminates, and what he believed to be a tricalcium alumino-ferrate ($3CaO \cdot Al_2O_3 \cdot Fe_2O_3$) compound. He also called attention to the colored flux which fills the voids between the crystals in the clinker. Hence, he was aware of the four major constituents ($3CaO \cdot SiO_2$, $2CaO \cdot SiO_2$, $3CaO \cdot Al_2O_3$ and $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$—if we assume his $3CaO \cdot Al_2O_3 \cdot Fe_2O_3$ was what is now known to contain more lime) now for some time accepted as being the major compounds present in Portland cement, as well as the flux of glass which so many still hesitate to acknowledge as a prominent part of cement. He believed only the tricalcium silicate played any significant part in the hardening processes, and that "the dicalcium silicate can only take a secondary part, if any, in the hardening of cements." Also in spite of his leaving the tricalcium aluminate mostly out of the picture as a clinker mineral, he goes into some detail regarding its hydration and its effect on disintegration of cement under unfavorable conditions.

The most excellent work done abroad and in this country since Le Chatelier's time has confirmed most of his findings and extended them to give the proper place to the dicalcium silicate and the lime alumino-ferrate, but has left the tricalcium aluminate and the flux (or better glass) still conspicuously uncertain. Uncertainty still remains as to the nature of the rôle of the always present so-called minor oxides. These include MgO, Na_2O, K_2O, FeO, TiO_2, Mn_2O_3, and P_2O_5 which will average a total of about 4 per cent. for the cements of the entire country, but in some cases will amount to 6 per cent. They should be considered minor only because our knowledge of the nature of their existence is meager or minor. They constitute a total that should justify our being concerned about accepting the premise that they may be ignored (especially in studying the physical properties of cement); that the only compounds in cement are the two lime silicates, the lime aluminate, and the lime alumino-ferrate; and that the latter compounds exist in a pure form, calculable as to amounts from the percentage of their component oxides found by analysis of the cement.

In the past several decades investigators have studied such ternary systems as SiO_2—Al_2O_3—CaO:CaO—MgO—SiO_2:CaO—FeO—SiO_2, etc., parts of the quaternary system CaO — SiO_2 — Al_2O_3—Fe_2O_3 and other oxide systems of interest to those studying cement. Data concerning the phase equilibria in these have been painstakingly obtained by not only one worker but frequently by several. The compounds noted were critically examined and their chemical, microscopical, and X-ray characteristics determined in accurate detail. By means of such data it may be possible to predict the state of equilibrium in clinker, *provided* that among other criteria the conditions of heating and cooling and the maximum temperature of burning are known and on the premise that all the lesser oxides in the mixture have no effect upon the equilibria of the four major ones. . . . When once Portland cement is mixed with water, it were better not to speak of hydrated cement, but always rather of hydrating cement. The reaction is one which continues, if water can have access to all the grains, until the constituents are broken down into the hydrates of the oxides originally present (or carbonates of these if in some cases carbon dioxide is available). Then cementitious products no longer remain. Hydration extends from a minimum of no commercial significance through an optimum of greatest value to a maximum—again of no commercial value. Hence, all the physical properties must be defined as of a specific stated time.

The studies of the rates of the reactions of water with the impure compounds referred to as being present in ground clinker enable one to assign approximately quantitative relative values to each of these for each of the physical properties. Thus, the rate of hydration of the lime aluminate to which the formula $3CaO \cdot Al_2O_3$ is assigned is more rapid than any of the other compounds now identified in Portland cement. (Parenthetically, we are stating this fact in this manner because, judging by the extremely rapid rate at which the alkalies Na_2O and K_2O can be removed from cement, it would seem that the compounds, as yet unidentified, which contain these hydrate more rapidly than the just cited aluminate.) Next in order is the lime alumino-ferrate (to which the formula $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$ is given), then the high-limed silicate (more or less impure $3CaO \cdot SiO_2$), and lastly the low-limed silicate (possibly even more impure $2CaO \cdot SiO_2$). There is left out of the discussion almost entirely the rôle of the "glass," even though this may exceed in amount that of both the aluminate and alumino-ferrate. This is necessary because of our dearth of information regarding the nature of the hydration of this, at times the third in amount, constituent of Portland cement. . . .

The high-limed aluminate, which at times is very difficult to detect in clinker either microscopically or by X-ray and in the majority of cases impossible to detect by these critical means, reacts so rapidly that all its physical effects are attained in about 24 hours. In the pure

* An abstract of the Edgar Marburg Lecture, read June 26, 1940, before the annual meeting of the American Society for Testing Materials, Atlantic City.

condition it reacts as rapidly as ground quicklime. Its total heat of hydration is approximately 200 calories per gram and practically all this is evolved in 24 hours. The pure lime alumino-ferrate evolves about half this quantity of heat, and requires approximately a month to do so. The high-limed silicate in about one month evolves nearly all of its total heat of 120 calories per gram, while the dicalcium silicate has generated but little at the end of 7 days and requires a year to develop all of its total heat of approximately 60 calories.

From such data it is possible to estimate very approximately the heat of hydration of any cement from its chemical analysis. If the cement is high in alumina and lime and low in silica and iron oxide, it will contain predominantly the high-limed aluminate and silicates and hence will generate a large amount of heat. In large masses of concrete, where the interior conditions approach adiabatic ones, a high temperature will be reached at about the same time rigidity will be attained. As the exterior cools to atmospheric temperatures the resulting differences in volume between the exterior and the interior may cause cracking. Hence, if one wishes to remedy this condition one of the ways which suggests itself is through such chemical limitations as will bring about the presence of those constituents in the cement as have low heat of hydration and rates of heat evolution. However, to be sure that this result has been obtained the heats of hydration at certain specified ages should be determined by calorimetric methods.

Although recently the heat of hydration of cement has been discussed so much due to the great amount of construction of dams where the sections are massive, the strength which a cement may attain on hardening still occupies our attention to the major degree. The pure cement compounds have now been studied for several decades as to the rate of attaining strength. Also a large number of carefully chemically analyzed commercial cements have been made into specimens whose strengths have been determined at many ages. Also such other properties as volume changes, resistance to freezing and thawing, heat of hydration, etc., have been ascertained. The percentages of the four major constituents in each of these cements were calculated by methods based upon a number of premises, outstanding among which are that the major oxides combine to form pure compounds, and that the minor oxides do not combine with the major ones or enter into (or influence the properties of) the major compounds. Then equations have been set up for each cement in which the sum of the percentages of each constituent equals the strength, heat of hydration, volume change, or what have you, at any age. Having at hand as many equations as cements, the contribution of each compound to any property has been calculated by the method of least squares.

As a result of the use of both the above procedures, there are at hand many data of use in predicting the physical characteristics of a hydrated cement from a chemical analysis of the non-hydrated material. From such data we know that the lime aluminate or the lime alumino-ferrate develops so little strength that the alumina and iron oxide may be ignored in this respect. The high-lime silicate, and consequently a high-lime low-silica cement, attains the greater part of its strength in a month; while the low-limed silicate unless extremely finely ground and in the presence of other materials which act somewhat catalytically, at the same age has developed hardly a tenth of the strength of the other silicate. By the end of a year the strength of the two types of silicates shows practically no difference.

Data show such a trend that we can conclude that many of the commercial cements would be improved as to durability if the alumina and iron oxide were reduced to an amount that in some cases would cause manufacturing difficulties. The relative value of the two silicates in respect to durability is known with less assurance. Possibly if all concrete, regardless of whether made of a high- or low-silica cement, could be protected for six months and ideally cured, it would be found that thereafter the two silicates would deport themselves alike in regard to permanency. . . .

Within the past decade there has been brought to the fore, and recently to a head, the agitation against one standard for cement and for the recognition of standards for five types. It happens that within that period, having started with emphasis on chemical composition, the discussion has centered on that thought. The need of physical tests was recognized, but thought of the difficulties to be encountered in developing them at all times prevented overcoming the inertia of getting under way. But now at this annual meeting, with the society considering the acceptance of tentative specifications for five types of cement in which chemical requirements are so outstanding and physical requirements so dimly visible, it seems time to start active work in developing physical tests despite the visioned difficulties—and the difficulties are more of vision than of fact. . . .

In a graph prepared by the Public Roads Administration from some data obtained from the laboratory of the Portland Cement Association the relation between the calculated lime-aluminate content of some cements and the expansion of some specimens of these subjected to alterations of freezing and thawing is shown. This was used in part in aiding in setting the limit on the permissible amounts of the calculated $3CaO \cdot Al_2O_3$ in the proposed tentative specifications for type II cement. These data have been used to show:

1. There is a positive trend in the relation between the amount of this compound and the resistance to freezing and thawing,
2. There is a positive lack of trend in this relation,
3. There is a trend sufficient to justify the use of the 8-per cent. limit presented in the new standard. . . .

Now, let us lay aside our rôle of a specification writer guarding the interests of the consumer and put ourselves in the position of the manufacturer. Two cements are shown to have approximately 11 per cent. aluminate and to have withstood 175 cycles of freezing and thawing. Certainly we can rightly protest the 8-per cent. limit since, although our products are 33 per cent. in excess of the permissible limit, they are better in the freezing-and-thawing tests than the majority of the cements within that limit. Then back in our rôle of specification writer we would tell the two producers that, granted that their contention is correct, the large majority of the cements exceeding the limit showed a much more unfavorable deportment in the physical test than those within the limit. Further, we can inform the two producers that we can not adopt limits which will permit a few excellent exceptional cements to be accepted when by so doing we allow the use of a much larger number of proved inferior ones. But in a third rôle — that of an investigator and a curious one in addition—we look at the data and say, without hesitancy or questioning, that something is wrong—if we hold (and we must) that the only variable in the specimens were the aluminate contents of the cements and that all specimens were similarly tested. Back in the rôle of producer we would demand that we be shown without question that our cement contained 11 per cent. aluminate. We would not accept calculated values. Finally, as a specification writer, we would have to confess that we have no way of meeting such demands and hardly half a dozen workers in the country are actively engaged in trying to solve the problem. . . .

The new tentative specifications, which it is hoped the A.S.T.M. will accept at this annual meeting, represent quite a departure from those which remain in the society's volume of adopted standards. These latter cover a "Standard Portland Cement" and a "High-Early-Strength Portland Cement." The

tentative standard, even though it will appear when accepted under a single serial designation, will be a standard covering five types of cement. Type I is practically the same as that covered by A.S.T.M. Specifications C 9-38; type II is quite similar to Federal Specification SS-C-206, wherein it is referred to as a Moderate Heat of Hardening Cement; type III, a high-early-strength cement, is essentially the same as A.S.T.M. Specifications C 74-38; type IV is quite similar to recent specifications of the Bureau of Reclamation for the purchase of Low Heat of Hardening cements; and type V is very close to Federal Specification SS-C-211, wherein it is referred to as a Sulphate-Resisting cement.

The question immediately arises—are such types needed and can you produce from commonly and cheaply available raw materials such ranges in SiO_2, Al_2O_3, Fe_2O_3 and CaO (and the minor adventitious oxides) content as will yield these different cements. The answer to this question, according to general consensus, is "yes." . . .

The question of the availability of raw materials and the possibility of commercially securing the ranges in composition that will yield cements meeting one or more of the five sets of requirements demands some attention. It is granted that in order to make all five types most manufacturers will have to bring to their plants varying amounts of raw material now not at hand. With the needed materials at hand it is possible to blend them so as to secure in the finished product the composition required by the specifications. But this does not necessarily mean that at all times these compositions will yield the values demanded by the few physical tests. Neither does it mean that other compositions will not at times give the required physical results and hoped-for job results. It does, however, mean that at the present stage of the development of the knowledge and the art of making cement we have not either completely correlated composition and physical properties or completely correlated chemical composition and all the compounds actually present in the cement. However, in the present stage, the specifications must give attention to, and base their requirements within limits on, the deportment of the majority rather than on the exceptional minority —even though it is granted that some of the exceptional minority in certain respects may be the more desirable. This applies particularly to the general cases of usage. In certain special cases the choice of the ideal exception should apply.

Granted that at times there is a lack of relation between composition and physical properties, one can be assured that the range in compositions made possible by the proper blending of raw materials will yield cements quite different in physical properties. One of these cements when properly chosen for a special service can be used with good assurance that better results will be obtained, if properly made into mortars and concretes, than by the use of one cement for all services. The user, therefore, has at hand five different products from which by intelligent use he can accomplish more satisfactory results than before. He must determine which type he should use in any case by studying the conditions under which he will use the cement, the conditions during its later life and the requirements in the standard wherein the nature of the several types is given. In many cases the choice is simple and can be quickly made. A high-early-strength cement would hardly be selected if there is no need for haste in construction or in placing the finished structure in use. A low-heat or a sulphate-resisting cement would hardly be selected for a reinforced-concrete frame building to be covered with brick or stone. There might be some question as to the choice of types I or II. In an increasing number of cases these is now no need for hesitancy, as the type I made by a considerable number of producers is identical to their type II, and this number will increase with time. But if experience has shown anyone that in general work he has obtained excellent results through the use of a cement which is truly type I, he had better continue with it rather than try a type II product. Types IV and V are for use when low heat of hydration and sulphate resistance, respectively, are of importance. They are special types which will not generally be kept in stock by producers, at least for some time in the future.

A word of caution must be given regarding the choice of cements for special uses, such for instance, as resistance to sea water. Can it be assumed if a type V cement is used for sea-water construction that *without question* our hopes for a very extended successful service will be realized? The answer is "no," but even with such an answer type V should be used. A positive "yes" can not be given to such a question. Concrete is not composed of cement alone and it is the other familiar components—and workmanship in particular—which in most cases are the causes of trouble and which compel the negative answer. But one can be certain that in the unfortunate cases where poor concrete may be made, the use of a cement of type V will very likely be an assurance of a greater life than if type I, II, or III had been employed.

The proposed new tentative specifications bring back into the standards of the A.S.T.M. an old friend who disappeared for a few years—the requirement covering fineness of grinding of the finished product. While this requirement might be welcomed back as an old friend, it surely caused in times past much unfriendly discussion. Whether there should be limits for fineness is a much-mooted question. Requirements of this kind surely are within the class of those which tell the manufacturer how to make his product and as such are among the least acceptable to specification details. It would seem that within reasonable limitations the manufacturer should be allowed to grind to whatever fineness yields the specified physical properties that are affected by the degree of comminution. The physical properties mostly affected by fineness are time of set and strength. Thus, a low-heat cement can be brought into the class of type I cement by grinding alone. The only distinction between many high-early-strength cements and type I cement is that the producer has taken his more "choicy" type I clinker and ground it about 1,000 square centimeters per gram finer than he would if making type I cement.

It is further known that it is not necessary to grind all kinds of clinker to the same degree of fineness to obtain the same strength. Why, therefore, not allow the producer to use whatever fineness will yield the strength indicated for each type? Why compel all to grind to the same minimum fineness? The candid answer is that many believe that fineness is closely associated with other properties, mostly undesirable, which through our ignorance we can not cover by test methods or limitations. For instance, many believe that fineness is intimately related to volume changes during hardening. Too-finely-ground cements are believed to require undue amounts of water and consequently undue shrinkage and cracking may result. But to meet such a viewpoint there should be a maximum limit and not the minimum limit which appears in the specification. Others feel that the coarse particles of the less-finely-ground material may hydrate later and cause disruptive expansion. Some question whether the very fine particles do not hydrate so promptly during mixing and placing that they confer nothing to the strength and may tend to be concentrated in any *laitance* formed or on surfaces against forms where they rather promptly cause map cracking or crazing, or unsightly weathering. However, as no one has brought forward suitable test procedures and specification requirements, the obviously unfortunate procedure has been followed of "saying it with fineness" and believing that by so doing we have not lessened the chances of getting a better cement but possibly increased them. . . .

About three years ago considerable

surprise was occasioned by the proposal that there be introduced into the society's standard specifications for Portland cement, a maximum permissible expansion of 1.0 per cent. as a result of submitting a neat cement bar, 24 hours old, to a steam pressure of 295 p.s.i. for 5 hours. This proposal originated with the producing interests who felt such an accelerated test would eliminate cements which would otherwise satisfactorily meet the standards, but which would show in service too great an expansion at a period of from 5 to 10 years after fabrication. Again, a very lively discussion arose and last year at a session of the society negative action was taken. In the proposed new tentative specifications it will be noted that an autoclave test is proposed with a maximum limit of 0.5 per cent. for all types of cement.

Whether or not a test of this nature should be in our standards and what the significance is of the test is still a debatable matter. You can rest assured, however, that the requirements can not in any manner jeopardize the consumer's interest. Even under the high limits for the expansion specified he is given additional protection so far as quality is concerned. Few producers have any difficulty in making "autoclave cement" when using the compositions required by types II, IV, and V. It may interest you to know that the low-heat cement being purchased by the Bureau of Reclamation must not exceed a maximum expansion of 0.2 per cent. according to this test. This is 60 per cent. less than that allowed by the society's proposed new tentative specifications. Some producers did have difficulties in meeting the demands when making cements of types I and III, but they have learned that, among other things, more rapid cooling of the clinker will result in a marked decrease of expansion in the high-pressure testing in the autoclave. Incidentally, this is an interesting illustration of certain phenomena not discussed in this talk, namely, changes in the character or structure of the clinker induced by manufacturing processes which cause changes in the physical properties of the cement. These structural changes in the clinker are not accompanied by calculated compositional changes. . . .

Among those interested in highway construction much thought has been given during the past decade to the resistance of concrete to the natural weathering agencies. To the effect of the natural agencies there must be added at times others, such as the use of calcium chloride on ice-covered highways during the winter season. Regardless of the extended work that has been carried out in the hopes of elucidating the relation between chemical composition and service under such conditions and in spite of the efforts to develop adequate predictive tests, no acceptable physical test suitable for such use in specifications has been brought forward. It is therefore necessary to continue to place our reliance on the results of the chemical analyses, the strength of the small specimens and the newly added autoclave test. Yet it is known that at times these have not resulted in our securing the hoped-for good quality concrete—even when we allow for all the other defects which may get into concrete, such as possibly bad aggregate, improper amounts of water, and inadequate workmanship of one kind or another. . . .

If we would accept without question the most frequently followed premise, namely, that the aluminate of lime forms complex sulphate salts having a much greater volume than the aluminate compound in the cement, then there should be a possibility of settling the issue by limiting the alumina or aluminate content. But even though this procedure is followed in the specifications to a certain extent, we are immediately faced with the fact that the true answer is not so simple. Many structures of high-alumina and aluminate cements exist in unfavorable sulphate surroundings and have met all hopes. . . . We are compelled to acknowledge that in many cases we must look elsewhere than to the aluminate for an explanation of the vulnerability of concrete to sulphate-solution attack. . . .

Until very recently anyone who would dare propose the use of admixtures with Portland cement to improve any somewhat lacking property was immediately figuratively killed with anathemas hurled by some producing interests. Then almost overnight (and a relatively recent night) there was a complete reversal of attitude on the producers' part. Now many of the latter are actively studying the effects of various kinds of admixtures as reflected in increased durability and quite a number are placing on the market cements containing such additions.

There never have been any logical reasons for this peculiar adverse attitude. The fact that all cements contain 3 or more per cent. of gypsum, added during the grinding of the clinker as a necessity to give a product meeting the time-of-setting requirements, has never made producers open-minded towards the possibility of using other admixtures to enhance other properties. The first breakdown of this attitude came a few years ago as the result of the marked ability of an organization to demonstrate that one of its products added to the clinker before grinding very materially reduced the cost of grinding. As a result the society's standards, first for High-Early-Strength Cement and in 1938 for Portland Cement were amended so that admixtures are conditionally permitted.

There is now agitation to permit the use of other admixtures. Some of these have been found very advantageous according to recent field and laboratory tests in increasing the life of concrete in highways subjected to "sanding" during freezing conditions with calcium chloride. Most of these are of such a nature that frothing takes place during mixing and consequently as much as 10 per cent. or more of air may be introduced into the wet concrete. This gives a readily placeable mixture, which before setting "bleeds" or releases water to a negligible degree. Like the grinding aid admixture first cited, these latter are used in very small quantities—mostly less than 0.05 per cent. of the weight of the cement.

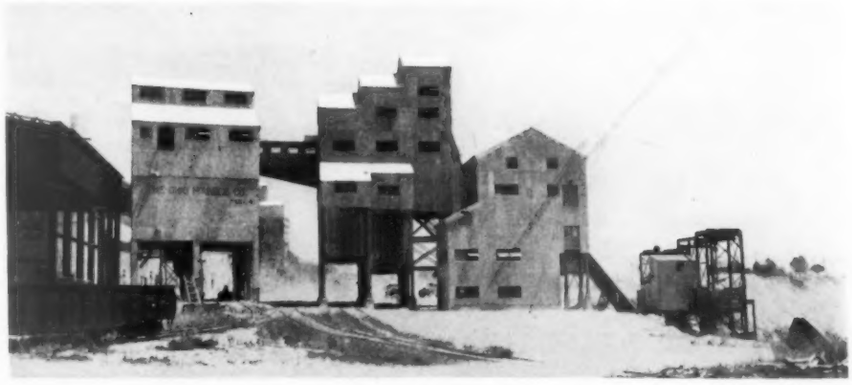
It is to be hoped that, with these two obvious examples before us of the betterment of cement through the use of admixtures, all concerned will have a more open mind in this matter. There is no reason to assume that improvement in other physical properties can not be secured by means of other additions. The setting and hardening of cement is a chemical reaction and in such all recognize and have before them many examples of the marked alterations in reactions induced by the presence of small quantities of foreign materials. It is granted that at times such reactions may be adversely affected by the small amounts of additions—as in the particular case of cement, the marked slowing of setting and hardening induced by very small quantities of solutions of sucrose or lead or zinc salts. But such positive results, even though adverse, should only seem to confirm the thought that there must be other materials which can cause advantageous effects.

Again, let us bear in mind that the setting and hardening of cement is a chemical reaction and further one which takes place very slowly. If we accept the belief of many, and some of us will not, that cement in the form of concrete is gaining strength continuously no matter what its age, then we must accept the fact that hydration or the reaction of the cement and water is continuing just as long. We know that the rate of the reaction can be materially accelerated by fine grinding of the cement, by heat, and to a less degree by the use of calcium chloride, etc. It does not take much of an imagination to conclude that there are likely a host of other materials which will speed up the reaction tremendously, possibly to the extent that within a day we may have the strength usually attained at the end of a year. It is curious that so much time has been

(Continued on page 49)

New Ohio Plant Specializing in Road Aggregates and Metallurgical Stone

THE OHIO MARBLE COMPANY of Piqua, Ohio, which operates as the Piqua Stone Products Company, has long been regarded as one of the most progressive concerns in the crushed-stone industry. New products have been added to its line as the market for them became apparent and its plants have been kept up with current practices and equipment. The company's first crushed-stone plant near Piqua was built in 1894. This was replaced in 1909 by a larger plant which was extensively improved and modernized from time to time before it was replaced this year by a new plant. The concrete storage bin, which was one of the few parts retained for the new plant, was built in 1922.



The Ohio Marble Company's plant with, left to right, the flux-stone, road-stone, scalping and secondary crushing, and primary crushing departments. Ground-limestone plant in rear.

Truck discharging load of stone to primary crusher. Elevator to plant in background.

The new plant, which went into operation early in July, 1940, is quite similar in general design to the one it replaced but incorporates many improvements. Building was done as much as possible while running the old plant and, as a result operations were shut down for only three weeks. The new plant consists of separate flux- and road-stone departments which can be operated separately or together. When producing mainly fluxing stone the plant capacity is 200 tons per hour, about the same as that of the old plant. The capacity when producing mainly road stone is somewhat less. Flexibility is the outstanding feature of this plant.

The deposit is typical Central Ohio limestone with thin and broken strata near the surface but solid further down. Overburden varies from 2 to 14 feet in depth and is loaded by a Marion 450 gas-electric shovel with a 1¼-cubic yard dipper. Trucks haul away the overburden which is being used to fill in the worked-out section of the quarry nearest the plant. Drilling is done on the 25- to 30-foot face with a Bucyrus-Armstrong 6-inch gasoline well drill. Single-row shots are made with from 10 to 20 holes. Secondary shooting is quite heavy. Secondary drilling is

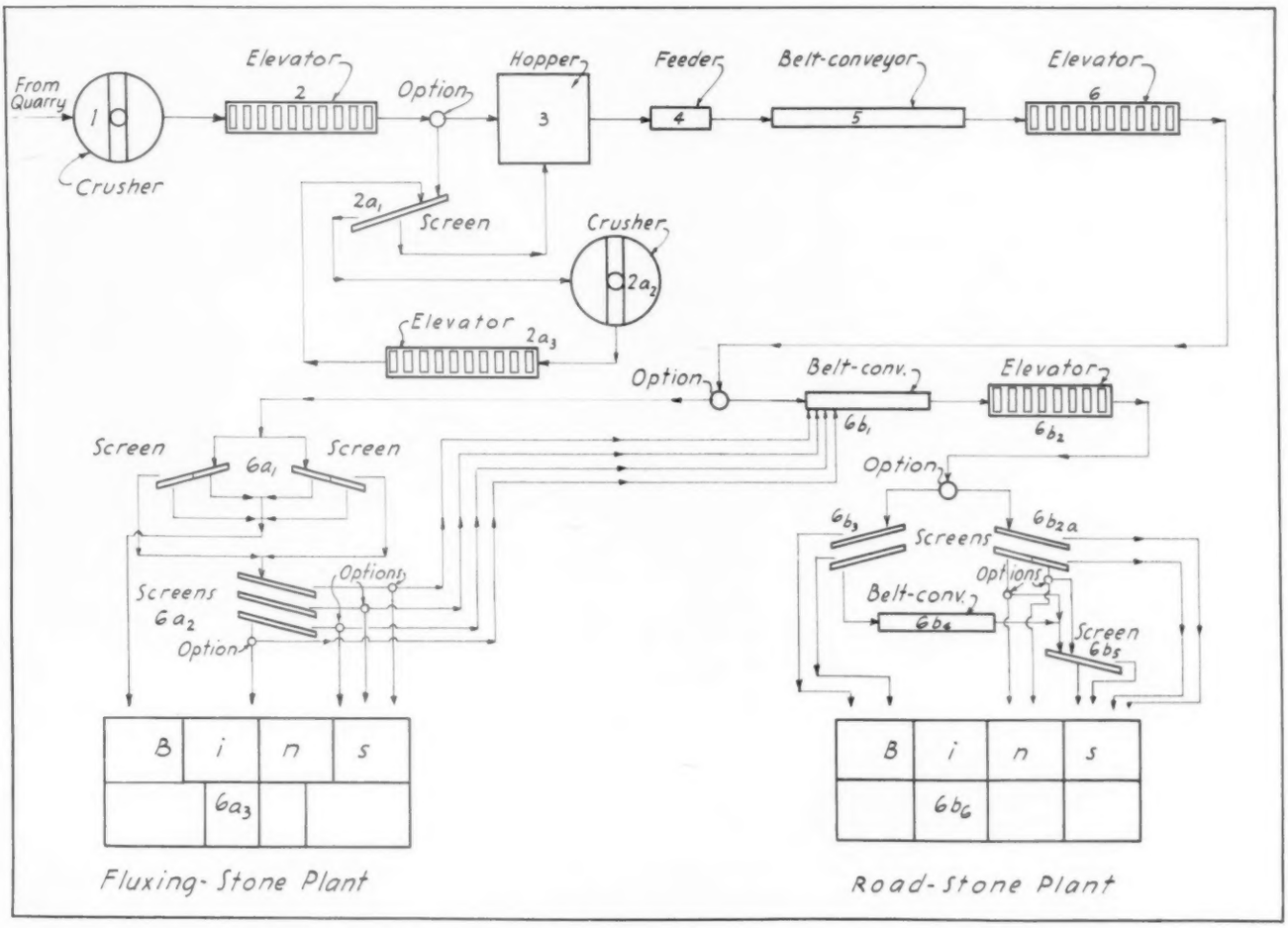
The electric vibrating feeder under plant hopper and conveyor to screens.

The 2-cubic yard electric shovel loading truck with special 5½-cubic yard end-dump body. In background are the well-drill and portable air-compressor for jackhammers.

TABULAR ANALYSIS OF THE OHIO MARBLE COMPANY'S CRUSHED-STONE PLANT, PIQUA, OHIO

(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key	Equipment	Make	Model Number, Size, Capacity or Type	Power Source	Transmission
Stripping		Shovel	Marion	No. 450, 1¼-cu. yd. gas-electric		
		Trucks				
Drilling		Well-drill	Bucyrus-Armstrong	6-in., gasoline		
Loading and Haulage		Shovels (2)	Marion	No. 37 and 480, 2-cu. yd. electric		
		Trucks (5)	General Motors White	5½-cu. yd., end-dump bodies		
Crushing	1	Crusher	Allis-Chalmers	Gyratory, No. 30 McCully	150-hp. Allis-Chalmers motor	V-belt, 12-strand
	2	Elevator (To $2a_1$ or 3)	Allis-Chalmers	Chain-bucket, 30-in. by 80-ft.	50-hp. Allis-Chalmers motor	V-belt and gear
		(From 2 and $2a_3$)				
	$2a_1$	Screen, scalping (Oversize to $2a_2$, throughs to 3)	Simplicity	4- by 12-ft., 1-deck	7½-hp. motor	V-belt
	$2a_2$	Crusher	Traylor	Gyratory, Type TY, No. 6	100-hp. General Electric	Goodrich V-belt
	$2a_3$	Elevator (To $2a_1$)	Jeffrey	Belt-bucket, 24-in. by 60-ft.	35-hp. Allis-Chalmers motor	V-belt and gear
	3	(From 2 or $2a_3$) Hopper		50-ton, steel		
Feeding and Conveying	4	Feeder	Jeffrey-Traylor		Rotary converter	
	5	Conveyor	Jeffrey	Belt, 36-in. by 40-ft.	7½-hp. motor	Gearmotor
	6	Elevator (To $6a_1$ for fluxing-stone plant, or $6b_1$ for road-stone plant)	Jeffrey	Chain-bucket, 34-in. by 90-ft.	35-hp. motor	V-belt and gear
Fluxing-stone Plant		(From 6)				
	$6a_1$	Screens (2) (Oversize to $6a_2$, throughs to $6a_3$)	Simplicity	Vibrating, 4- by 10-foot, 1-deck	7½-hp. motors	V-belt
	$6a_2$	Screen (Oversize and throughs to $6a_3$ or $6b_1$)	Simplicity	Vibrating, 4- by 12-foot, 3-deck	Motor	V-belt
	$6a_3$	(From $6a_1$ and $6a_2$) Bins (7) (To cars or trucks)		Steel, 7-compartment, 156 tons each		
Road-stone Plant		(From 6 or $6a_2$)				
	$6b_1$	Conveyor	Jeffrey	Belt, 24-in. by 50-ft.	7½-hp. motor	Gearmotor and chain
	$6b_2$	Elevator (To $6b_3$ or $6b_{3a}$)	Jeffrey	Chain-bucket, 20-in. by 35-ft.	15-hp. motor	Flat belt
	$6b_{3a}$	(From $6b_2$) Screen (To $6b_5$ or $6b_6$)	Allis-Chalmers	Vibrating, 4 by 8-ft., 2-deck	5-hp. motor	V-belt
	$6b_3$	Screen (Oversize to $6b_6$; throughs to $6b_4$)	Simp'icity	Vibrating, 4 by 8-ft., 2-deck	7½-hp. motor	V-belt
	$6b_4$	Conveyor (From $6b_1$ and $6b_{2a}$)	Jeffrey	Belt, 14-in. by 25-ft.	Motor	V-belt
	$6b_5$	Screen (From $6b_3$, $6b_5$ and $6b_{2a}$)	Allis-Chalmers	Vibrating, Low-Head, 3- by 10-ft., 1-deck	5-hp. motor	V-belt
	$6b_6$	Bins (8) (To cars, trucks or pulverizing plant)		Concrete, 8-compartment, 200 tons each		

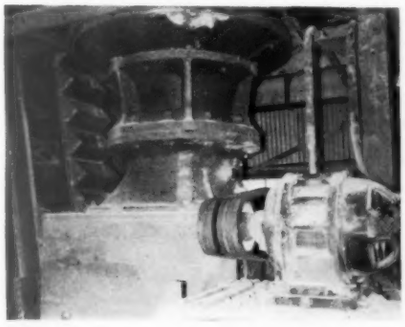


Flow-sheet of Ohio Marble Company plant at Piqua, Ohio, showing major equipment and flow of material.

done with Sullivan and Ingersoll-Rand jackhammers supplied with air by a Chicago Pneumatic portable gasoline-driven compressor.

Stone is loaded by Marion 480 and 37 electric shovels with 2-cubic yard dippers. A fleet of five trucks equipped with Galion 5½-cubic yard end-dump bodies and Galion hydraulic hoists is used to haul stone to the plant. General Motors and White trucks are used. Usually 3 or 4 of these trucks are required to operate the plant at capacity. At present the length of haul is about ¾ mile one way.

Conveyor from electric vibrating feeder to chain bucket-elevator to screening departments.



The No. 6 gyratory secondary crusher with elevator in background.

At the plant stone is dumped from the trucks into the Allis-Chalmers McCully No. 30 gyratory primary crusher. The minus 4-inch product is carried by a 30-inch by 80-foot Allis-Chalmers inclined chain-bucket elevator. A special chute allows direct discharge of this stone into a 50-ton steel surge hopper when fluxing stone is being made. When crushed road stone is being produced, the stone is discharged from the elevator on a 4- by 12-foot Simplicity single-deck vibrating screen with 1-inch square openings. Size control is accomplished by varying the crusher setting from ½ inch to 2½ inches and by changing screen sections on the 4-foot by 12-foot screen. The oversize goes into a No. 6 Traylor TY reduction crusher. The product of the crusher is

The screen and spout which are rolled out of the way when secondary crusher at right is by-passed.

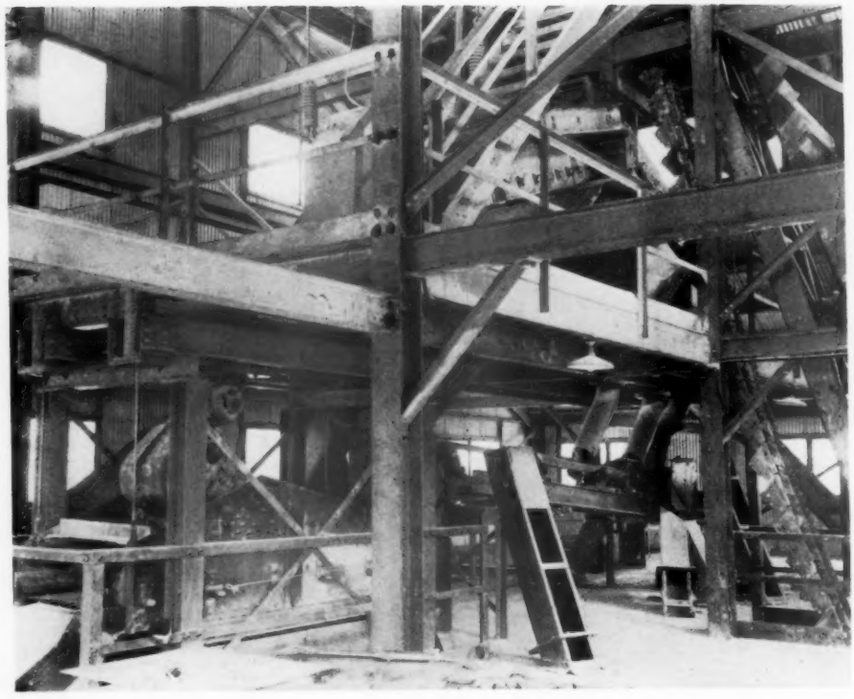
then returned to the 4-foot by 12-foot screen by a 24-inch by 60-foot belt-bucket elevator. The material passing through the screen drops into the surge hopper, which has eliminated most of the delays experienced in the old plant whenever the quarry or primary crusher was down.

This screen and its discharge chute are suspended from an overhead carriage mounted on wheels traveling on short rails. When fluxing stone is being produced the screen is rolled back out of the way. When rolled back under the chute from the main elevator the discharge spouts of the screen are in a position to feed the TY crusher, which, in turn, feeds the return elevator. The surge bin is cleared of one type of stone before the change-over to the other type is made.

A Jeffrey-Traylor vibrating feeder discharges stone from the hopper on a 36-inch by 40-foot inclined belt-conveyor. A Jeffrey 34-inch by 90-foot inclined chain-bucket elevator takes it to the top of the fluxing-stone plant.

When producing flux the stone is discharged from the elevator through a split chute on two 4-foot by 10-foot Simplicity single-deck screens. Each of these screens is equipped half with 1-inch and half with 1¼-inch square perforated plate. The screenings passing through these screens can be discharged through split chutes into several bins.

The material retained on these screens drops on a 4- by 12-foot Simplicity screen, which has three decks that are usually equipped with 2½-, 2-, and 1¾-inch perforated plate. Special chutes make it possible to discharge any of the four sizes of stone produced into any of several bins or on a conveyor to the road-stone plant. There are seven steel bins each with a capacity of 150 tons. Two bins are ordinarily used for 4- to 1½-inch flux, two for 2- to 2½-inch cupola flux, two for 2½- to 1½-inch road stone, and one for 1¼-inch minus screenings. Cars can be loaded under four of these bins and trucks under them all.



Arrangement of screens in the road-stone building with elevator at right. In background are short conveyor to final screen and some of the selective revolving spouts under screens.

This view in flux-stone department shows selective chutes which distribute products of two primary screens into the desired bins.

When road stone is the primary product, the bottom is removed from the split chute described above as feeding from the elevator to the two single-deck screens. The stone drops on a 24-inch by 50-foot belt-conveyor, which carries it through an inclosed passageway into the road-stone building. When fine sizes of road stone are in demand, or when one type of flux only is desired, the screenings or other products of the triple-deck screen in the flux plant can be discharged from the screen on this conveyor. A 20-inch by 35-foot Jeffrey chain-bucket elevator discharges the stone through a split chute with an adjustable gate on either or both of two vibrating screens.

On one side of the chute is a 4-foot by 8-foot Simplicity 2-deck screen. This is usually equipped with 1-inch and ¾-inch perforated plate. Materials passing over both decks drop through chutes into bins for road stone. Material passing through the bottom deck drops on a 14-inch by 25-foot belt-conveyor feeding a 3-foot by 10-foot Allis-Chalmers Low Head single-deck screen. This has 3/16-inch openings. The No. 7 stone passing over it and the finest passing through it drop through chutes into bins.

On the other side of the split chute is a 4-foot by 8-foot Allis-Chalmers 2-deck screen on which various sizes of openings are used. On the top deck perforated plates, ranging from 1-inch down to ⅜-inch, are used. The bottom

(Continued on page 51)

The lime, limestone and mineral-wool plants of the Riverton Lime & Stone Company, Riverton, Virginia, as seen from the air.

SALESMEN'S REPORTS GIVE US A TRUE PICTURE OF CONDITIONS IN OUR FIELD

Says E. I. WILLIAMS
Sales Manager, Riverton Lime & Stone Company

THERE are probably as many ways of managing sales as there are sales managers, and one way is to place the sales manager in a position similar to that of a colonel of a regiment, with his majors (division or product managers), captains (district managers), and lieutenants (the salesmen).

The colonel, or sales manager, has one objective, not just to make volume of sales, but to make *money* for his company. This factor is often overlooked by many sales managers and other executives. We have tried to keep this fact in front of us by certain reports which will be explained later.

Note that in this comparison we do not consider the salesmen as "buck privates" who simply do pretty much as they are told, but rather as lieutenants; and there is a reason for this. In action the regiment may be broken down into platoons, each in charge of a lieutenant. He it is who, having an order to do a certain thing, or reach a certain objective, has to deploy his men to best advantage, changing his tactics, depending upon what he encounters at the moment, and using his men as he feels best under the conditions, always with the idea of reaching the objective. That is why we feel the salesman is like the lieutenant. His men are the sales arguments—quality, service, fair price. sales helps such as advertising and literature, follow-up letters, construction reports, etc.

We manufacture hydraulic lime, hydrated and quick lime, rock-wool insulation, and crushed limestone for ballast, concrete, road and agricultural use. The distribution of stone is naturally pretty well limited within a radius of 75 miles or less and is handled from the office, but the other products are shipped over quite an area, and we have salesmen in the different states we serve.

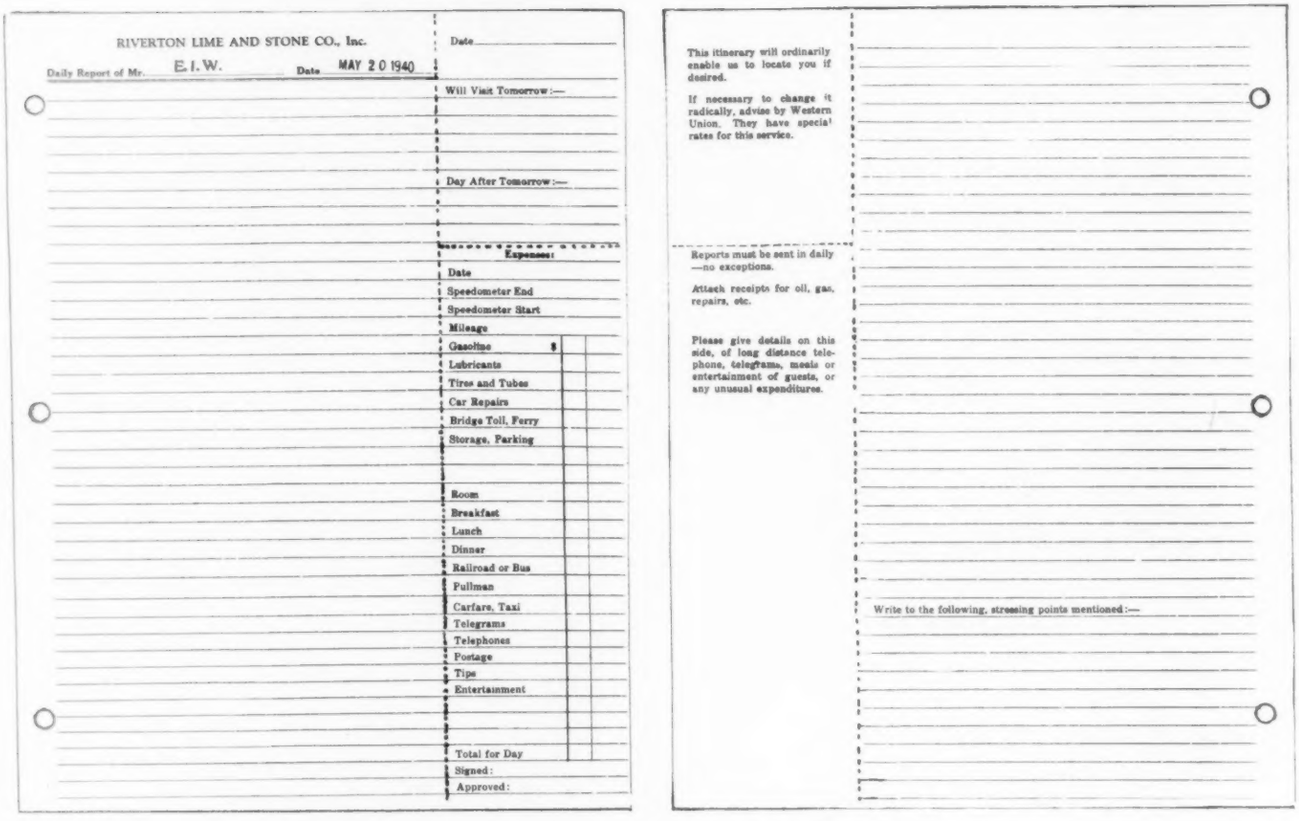
The salesman in any particular state should know the conditions in that state far better than it is possible for us in the office to know them. He is furnished Dodge reports of current construction and we do not attempt to tell him where to go or whom to see, believing that our job is to make the sales policies, correlate the work of the different salesmen, give them all the help we can in the way of follow-up letters, and handle efficiently the correspondence and many problems that are always coming up—in other words, furnish the lieutenant with good buck privates and keep the "line of supply" open and working properly, with plenty of ammunition.

While we make no effort to tell the salesman what to do and whom to see, we must know *what* he has *done* and *whom* he has *seen*, and this information is contained in his daily report. And it is the daily report that makes one of the most difficult problems a sales manager has. No salesman likes to make a report; in fact he often dislikes it so much that it bothers him more and more, and finally the mole hill has become a mountain; writing *any* kind of report seems a terrible task. This is understandable. If he has done a full day's work he is tired and doesn't feel up to it. If he hasn't, he's probably a little ashamed of it, or if he's lazy, he naturally doesn't want to do anything but "get by"!

Appreciating these conditions, we tried several forms of reports until the one described was developed, and we feel this has worked very satisfactorily, giving the maximum amount of information with the minimum amount of trouble.

The "Daily Report" (Figure 1) is made out in duplicate. The original (white) is in three sections, separated by perforations. The main body of the report is for the details of visits; and lists, first, the town, then the calls made in that town. Symbols are used to classify the prospect, *e.g., A* for architect or engineer, *C* for contractor, *D* for building-supply or lumber dealer, etc. After all calls are listed for that town, the next town is listed with its calls. The reason for clearly separating the towns is brought out later.

The upper right-hand section of the



RIVERTON LIME AND STONE CO., Inc.

Daily Report of Mr. E. I. W. Date MAY 20 1940

Will Visit Tomorrow:—

Day After Tomorrow:—

Expenses:

Date		
Speedometer End		
Speedometer Start		
Mileage		
Gasoline	$	
Lubricants		
Tires and Tubes		
Car Repairs		
Bridge Toll, Ferry		
Storage, Parking		
Room		
Breakfast		
Lunch		
Dinner		
Railroad or Bus		
Pullman		
Carfare, Taxi		
Telegrams		
Telephones		
Postage		
Tips		
Entertainment		
Total for Day		

Signed:

Approved:

This itinerary will ordinarily enable us to locate you if desired.

If necessary to change it radically, advise by Western Union. They have special rates for this service.

Reports must be sent in daily —no exceptions.

Attach receipts for oil, gas, repairs, etc.

Please give details on this side, of long distance telephone, telegrams, meals or entertainment of guests, or any unusual expenditures.

Write to the following, stressing points mentioned:—

Figure 1. Front and back of salesman's daily report blank.

MONTH: *SALES AND VALUATION* *TERRITORY:*

Territory Number or County	Valuation ($1000)	Barrels Flamingo		Lime (*tons*)	Wool (*tons*)	
		Mortar	Concrete			

Figure 2. Report sent to salesman monthly showing the construction valuation (in thousands of dollars) and the shipments of the different products to each "area" in his territory.

original is torn off as soon as the report comes to the office, and is given to the telephone operator. In this section the salesman lists the towns he expects to visit the next day and the day after. These are always subject to correction, but in case of necessity the operator can usually locate the salesman by contacting the towns mentioned. While the salesman may be going on a special call, we know he will also get in touch with one or more dealers, contractors, or architects. In case of a complete change of schedule, the salesman is requested to telegraph us, which can be done very reasonably. This part of the report is thrown away when it has served its purpose.

The lower right-hand section of the original goes with the main body of the report to the sales manager and, after approval, to the clerk in charge of reports. (She also has other duties, as the reports take but a small part of her time.) These items are transferred to another form covering eight days. These forms are sent to the treasurer, who forwards checks to the salesmen for the periods from 1st to 8th, 9th to 16th, 17th to 24th, and 25th to the end of the month.

We have tried to make the items cover practically everything. Tips and entertainment are listed, as both are legitimate parts of the salesman's expenses, and we would rather have them listed than covered up. Both must be

watched and kept within bounds, however. Our instruction to the salesman is "Treat the money as though it were coming from *your* pocket. If you were the boss, and would spend this money, go ahead. If you wouldn't, then don't!" If a salesman can not be trusted, it is better to get rid of him than constantly argue about the expense sheet. Of course, there are some items that are criticized, but this occurs very seldom in our organization.

We use credit cards of one of the large oil companies, so the salesman doesn't often use the spaces for gasoline, oil, or tires.

Figure 1 shows the report form. We want the body of the report as brief as possible, in order to make it easier for the salesman, and just the high-lights of the call brought out together with any and all information on competitive products. In case additional room is needed, we have plain "second sheets", that is, without the right-hand section.

About the 20th of the month the report sheets for the next month are sent out. The white sheets are stamped with the salesman's initials and the date on each section of each report. The sheets are alternated white and yellow (which is his copy, and identical with the white sheet except that it is not perforated) so that he can insert them right in his book. A new sheet of carbon paper and stamped, addressed envelopes complete the package. The book is a stiff-cover ring-binder so that the report can be written right in the book.

When the salesman wants a letter written to any particular person, or some item handled in a special way, it is indicated on the back of the sheet at the bottom, and the report is never filed until those requests have been taken care of in some way.

Indexing or filing reports may be done in several ways. In our business we think the town is perhaps the simplest for reference purposes, and at one time we had an individual report for each town, which was then filed under that town. This meant a lot of paper work for the salesman, sometimes using five or six different sheets of paper, and the files grew rapidly.

In connection with our present report, we use a card index of 5-inch by 8-inch plain ruled cards. On each card is listed a town that has been visited by any salesman. All the calls to this town are then noted by the date of the call and the initials of the person calling. While the majority of these entries are not referred to again, we feel it pays because of the time saved when we do want the information.

We get Dodge reports for most of our territory in duplicate. One service is sent direct to the salesman, and the duplicate service comes to our office.

Now suppose some question comes up, we'll say, regarding an industrial building in Fredericksburg, Virginia. Looking in Spotsylvania County, we get the Dodge report, which gives the names of the owner (in Pittsburgh), the architect (who is in Richmond, Virginia), and the contractor (from Charlotte, North Carolina). Having so many towns represented is not at all unusual. The representative covering eastern Virginia would naturally have seen the architect, who is in his own territory. He may request us to have the Pennsylvania representative call on the owner, or the North Carolina representative see the contractor. It takes but a few minutes for the report clerk to get the card for the town in quesion. From this "town card" she finds the dates on which our salesman has called and gets the reports for those dates. It may mean glancing through only two or three reports instead of a long search. It is quite possible that our representative had already reported on some phase of the job in some previous call. If not, he is written, with a copy going to the salesman who made the request, so the latter will know that his request is being taken care of.

At the end of the month the salesman is sent a summary of his calls, showing the towns visited and the people seen. If he uses this as he should, it gives him a pretty good picture of his calls. Has he covered the territory

TERRITORY:.....

MONTH OF:.....

						Totals			Net	
	Quantity	Price	Value	Quantity	Price	Value	Quantity	Price	Value	Credits	Value
Flamingo:											
Mortar.....*barrels*											
Concrete.....*barrels*											
Colored.....*barrels*											
Other.....*barrels*											
Totals.....											
Building Lime:											
Superfine.....*barrels*											
Steel.....*barrels*											
Jute.....*barrels*											
Masons' Hydrate.....*tons*											
Ohio Finishing.....*tons*											
Totals.....											
Rock Wool:											
Loose.....*tons*											
Granulated.....*tons*											
Bats.....*tons*											
Totals.....											
Total Value Building Products.....											
Agricultural Lime.....*tons*											
Ground Limestone.....*tons*											
Total Value, All Products											
Credits.....											
Net Value, All Products.....											

Salesman's Expenses.....

Salesman's Salary.....

Direct Selling Expense.....

Figure 3. Report made up monthly on this sheet gives the quantities shipped of the various materials, the value of these products, and the price is arrived at from these two figures. Two different columns are used as some of the salesmen may have a part of two different states.

	1	2	Half-year	3	9 Months	4	Year
Construction ($1000)							
Sales—Mortar							
Concrete							
Other							
Lime (Building)							
Rock Wool							
Totals							
Sales After Credits							
Direct Sales Cost							
Percentage Cost to Net Sales							
Sales per Unit of Construction							
MATERIAL SOLD:							
Mortar ...barrels							
Concrete ...barrels							
Lime ...tons							
Rock Wool ...tons							
Calls on: Contractors							
Dealers							
Architects							
Totals							
Sales per call ...dollars							
Cost per call							
Mortar per Unit of Construction							
Concrete per Unit of Construction							
Lime per Unit of Construction							
Rock Wool per Unit of Construction							

Figure 4. This report is made up quarterly. The figures in the "half," "9-month," and "year" columns are in red, as they are the totals to date.

TERRITORY.....YEAR.....

Building Products only, no Stone or Agricultural Lime. Cash Discounts not considered.

Month	Cost of Products	Direct Sales Cost	Total Cost	Net Sales at Plant	Profit	
January						
February						
March						
1st Quarter						
April						
May						
June						
2nd Quarter						
6 months						
July						
August						
September						
3rd Quarter						
9 months						
October						
November						
December						
4th Quarter						
Year						

Figure 5. The final sheet in which the costs, net sales, and profits are listed for each territory.

properly, or has he spent too much time in certain sections and not enough in others? Is he seeing enough different people, or seeing his old friends to the exclusion of others? Not that we want him to neglect or overlook his old friends, but he may be wasting too much of *his* time and *theirs* too! He will also find listed at the bottom a recapitulation, *e.g.*:

	Calls	Duplications	Total
Architects (or engineers)	25	5	30
Contractors	60	15	75
Dealers	40	10	50
	125	30	155

Is he getting a good balance, or is he neglecting the architects for present and future specifications?

The salesman's territory is split up into a number of "trading areas", each consisting of from one to six or eight counties, depending upon the towns, population, etc. At first we listed the figures for each county separately, but there were so many that the figures were confusing. It also developed that the sales to dealers were often in one county, while a large part of the construction served was in an adjacent county, which made for further confusion.

When our copies of the construction reports are received they go first to the statistician who lists in each "area" the construction awarded, or, if not done by contract, he lists it when work begins, by "thousands of dollars".

These then go to the sales manager, who looks them over to see if possibly the work involves more than one salesman's territory, as he may want to notify another salesman, who probably would have had no knowledge of the project, to check on some particular item. The reports are then filed by counties.

This listing of the construction gives a general idea of the activity in each area. We realize that the reports do not get all the construction, and that our products may not be suitable for use in some of the construction listed; but assuming that these percentages will remain fairly constant, we at least get a pretty good idea of the trend, which should help us in our analysis of the territory.

Sales by volume are also separated for each "trading area" and each month the salesman is sent a sheet (Figure 2), showing the trading areas (which are numbered) and for each area:

(1) The contracts awarded, or construction started in thousands of dollars.

(2) The volume of each product sold, *e.g.*, barrels of hydraulic lime, tons of rock wool, tons of common lime.

The totals of these areas give the results for his territory. This sheet can also be of considerable use to the salesman, showing him those areas where he is getting a fair share of the construction and those areas in which he is weak. Possibly he is spending too much time in areas where there is little work, or *vice versa*.

This completes the reports sent to the salesman monthly. At the end of the year he is sent data showing his sales to all dealers for the year and several years previous (Figure 3). This brings out new dealers we have made, old dealers we may have lost, etc. He is also sent a sheet (Figure 4), giving construction and sales by areas for the year.

In the beginning of this article it was brought out that a sales manager's objective should be to make money, not just sales, and that we had a report made to show this up. This report (Figure 5) is made for each salesman's territory and shows:

(1) Quantity of each product shipped,
(2) Cost f.o.b. plant of each product shipped, including everything except direct selling, by which is meant the salesman's salary or commission and his expenses for that particular territory,
(3) Amount received for each type of products, deducting transportation claims, dealer commissions, material used for advertising, etc.

These are totaled and the "Direct Selling" cost is listed for the territory. From this we get:

(1) Cost of all goods except direct selling,
(2) Direct-selling cost,
(3) Total cost,
(4) Total receipts,
(5) Profit for territory,
(6) Ratio of profit to sales,
(7) Ratio of selling cost to sales, etc.

If any item in the line is showing a loss in a given territory, either because of high transportation or low prices of competitive products, these items should be eliminated from that territory, or at least cut to the minimum volume when possible. Of course, there are times when certain items must be continued at little or no profit, but these reports at least keep the sales manager informed when such a thing is happening and it isn't covered up. And they also bring out the profitable items.

We believe that, with the reports listed, the salesman knows better what is going on in his territory, and that the sales manager—or, in larger companies, the district manager—can get a pretty accurate picture. What he does with the facts presented depends upon many things, but at least he will know what is going on, and not have to guess. After all, if reports furnished the true picture, they are doing all that can be expected.

Bates

(from page 40)

spent in developing different kinds of cement and so little on developing very promptly, by means of admixtures, the full inherent qualities of the cements already at hand. . . .

The excellent qualities of low-heat cements for mass concrete are generally accepted. But such cements have a low rate of hardening and acquiring strength. Indeed, this is so marked that in some cases during cooler weather, in order not to delay work through the need of the longer holding of the forms in place due to slow hardening, it was necessary to substitute moderate-heat-of-hardening cements for the low-heat ones. Further, if the low-heat cements are also low in both alumina and iron oxide, we have a sulphate-resisting type of cement, which is also slow hardening. Also at this time there is a marked tendency to depart from the high-limed cements to the high-silica ones. These, like the low-heat and sulphate-resisting types, unless very finely ground, are also slow-hardening. . . .

When it became evident that the specifications for low-heat cement for Boulder Dam would be based upon compositional as well as physical (calorimetric) requirements, objection was raised by one producer on the score that, by "heat treating" cement of ordinary composition and hence different from the proposed low-heat composition, he could produce a low-heat cement according to the calorimetric requirement. Since then it has frequently been found that, by the calorimetric measurements, the heat of hydration differs markedly from that which could be calculated from the composition. Also cements of practically identical composition have far from identical heats of hydration.

With the reopening of the question of autoclave testing of cements a few years ago, some little research soon showed that a rapid cooling of the clinker would in many cases result in a cement which had decidedly less autoclave expansion than the same cement slowly cooled.

Both these cases bring vividly to us the fact that without making any compositional changes the quality of the ground clinker, evaluated in two widely different manners, has been materially changed through processing subsequent to the attaining of the maximum kiln temperature. . . .

Suppose we take as typical the case of using limestone and clay as raw materials. Even though other raw materials might be used, they would differ from these only in the relative amounts of the component oxides. These are ground together and then charged into the rotating kiln. Dehydration first takes place. Then follows, almost simultaneously, decarbonation of the limestone and a breaking down of the clay into free SiO_2, Al_2O_3, etc. Then recombination starts to take place, but mostly through diffusion and to a minor degree through melting and subsequent crystallization. How much formation of glass takes place depends upon very many circumstances—such as the lime-silica ratio, the amounts of Al_2O_3 and Fe_2O_3 and their ratio, the amount of fluxing agents at hand such as MgO, P_2O_5, Na_2O_3, K_2O, etc., the maximum temperature, the length of time at the maximum temperature, etc. Next let us assume that under any one set of conditions the time and temperature of heating have been such that equilibrium has been attained. Under this hypothesis, what is the likelihood of maintaining this state during cooling and, corollarially, what are the possibilities of altering it? Even a casual reference to the phase equilibria diagrams of the ternary system $CaO—Al_2O_3—SiO_2$ by Rankin and Wright and to its extension into part of the quaternary system $CaO—Al_2O_3—Fe_2O_3—SiO_2$ by Lee indicates that likely the high-temperature equilibrium has not been maintained and in many cases could not be. Further, one would see that, by such "heat treating" as different reheatings and coolings under closely controlled conditions or by different controlled rates of cooling, it is possible to bring about the formation of distinctly different amounts of the compounds.

Examination by the petrographic microscope has confirmed that the different conditions cited give optically different clinker and the ground clinker yields different physical results. It seems quite certain, therefore, that "heat treating" can produce decided changes evidenced by different qualities of the finished cement. . . .

Granted that the rotary kiln has done so much to develop the industry and to make it possible to market a commodity at the customary low price, it seems good to remember that furnace design of all kinds has materially developed since the advent of the rotary kiln. Even the old stack kiln, thrown completely over by the domestic cement producers, could be slightly modified to allow more uniform operation and control than the rotary kiln. The installation of regenerators or recuperators would reduce it to a very low cost fuel furnace. But the ceramic industry, which has so long favored the stack kiln, is supplanting it with tunnel or ring kilns, due to their increased fuel economy and ease of exactness of control. Either of these two types would allow wider ranges of rates of heating and cooling, and the ring type would allow simultaneous burning of several types of cement requiring different burning temperatures. . . .

The J & K Stone Company plant and its welded-steel framework.

Small Indiana Crushed-Stone Plant Has Big-Plant Features

THE J & K Stone Company at Rigdon, Indiana operates a small crushed-stone plant which has several features usually found only in larger plants. Built entirely of steel this plant is fireproof and it has the flexibility of crushing and sizing necessary to meet present-day demands. Its capacity is from 80 to 100 tons per hour depending on the maximum size of stone being produced. The main section of the plant was completed early in 1939 and the washing department was added later.

The quarry was developed on 100 acres of leased property with from 3 to 10 feet of overburden which is removed at odd times with the quarry shovel and trucks. Good limestone meeting all specifications is known to exist to a depth of at least 150 feet. Blast-hole drilling is done with a 5-inch drill and the height of the quarry face, which is now about 30 feet, is being increased as the quarry is developed. Trojan 40- and 60-per cent. explosives are used. Little secondary breakage is necessary due mainly to the stratification of the deposit and this is done by sledging.

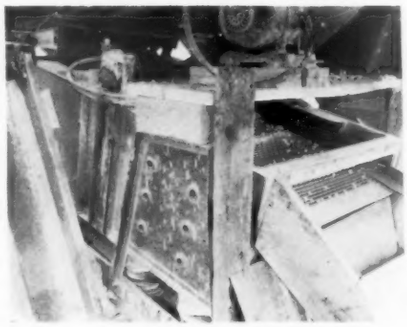
Stone is loaded into trucks by a Thew 75 A gasoline shovel with a ¾-cubic yard dipper. Three trucks are used, two Indianas and an International. These haul the stone up a fill from which it is discharged into the 16-inch Allis-Chalmers McCully gyratory primary crusher. Stone is reduced in this crusher to a maximum of 3½-inches or less, according to the demand. A 24-inch by 150-foot inclined belt-conveyor carries the crusher product to the top of the main plant where it is discharged into a 4- by 20-foot revolving screen. Chicago perforated plate is used exclusively in this screen with 1¼-, 2-, and 3-inch openings on the main barrel and 3/16-inch openings on the 7-foot long sand jacket. The four through products of this screen can be discharged into four 50-cubic yard circular steel truck-loading bins. Most of this stone is used for highway-maintenance work.

The plus 3-inch oversize and any of the other sizes produced by this screen can be discharged through a chute into a 6-inch Allis-Chalmers gyratory reduction crusher. A 20-inch by 78-foot Stephens-Adamson belt-conveyor carries this stone back to the main conveyor.

Under the revolving screen is a 4- by 6-foot Deister Machine Company 3-deck Plat-O vibrating screen which is used for closer sizing of its products, usually the finer sizes. All or any of the products of the vibrating screen can be discharged into bins. Each of the products of both screens or any combination of them can also be discharged on a 20-inch by 35-foot Stephens-Adamson belt conveyor feeding a 4- by 6-foot belt conveyor to the washing department. A 4- by 6-foot Deister Plat-O 3-deck screen equipped with spray nozzles of the same make is used for washing and fine sizing. The products of this screen are discharged into the three 75-cubic yard compartments of a steel truck-loading bin. The stone is mainly for black top and concrete work.

All shipments are made in trucks which are weighed on a Winslow truck scale. Trucks are loaded from stockpiles by a Barber-Greene loader. The quarry shovel can also be converted into a crane and used for this purpose. Overburden from the quarry has been used to build a ramp from which trucks dump the sized stone into stockpiles.

The ¾-cubic yard shovel loading a truck in the quarry.



Vibrating screen which follows the primary revolving screen.

Portable loader filling a truck from the stock-pile.

The plant was designed by its owners, the Irving brothers, who also operate the Irving Brothers Gravel Company with a plant at Marion, Indiana, the Pipe Creek Stone Company with a plant at Sweetser, and the Irving

K. K. Irving and Wilfred Shaw at the office scale house.

Brothers Sand & Gravel Company with two plants at New Haven, near Fort Wayne. The company also operates several portable plants. The company's forces erected the entire plant including the welded-steel framework.

K. K. Irving is general manager of the J & K Stone Company. F. W. Irving is manager of the Irving Brothers Gravel Company and the Pipe Creek Stone Company. Ray Irving is president of the Irving Brothers Sand & Gravel Company.

Iron City

(from page 35)

on a 24-inch by 47-foot Barber Greene belt-conveyor. This belt feeds a 4-foot by 10-foot Allis-Chalmers Type B heavy-duty vibrating screen equipped with 2¼-inch wire cloth. The oversize material is returned to the crusher on an 18-inch by 57-foot Barber-Greene conveyor. Material through this screen is elevated to the final sizing screens over the storage bins. Types 2b and 3a aggregates (¼- to 1-inch and 1- to 2-inch) are in most demand, and in order to produce these ⅜- to 3½-inch gravel is fed into this system.

The Iron City Sand & Gravel Company has been in the crushed-gravel business since 1929 and has been producing sand and gravel since 1892. In addition to the two yards described in this article it operates another at Second Avenue and the Monongahela River and has dealer outlets in many other cities. One dredge is now being operated and this is at present located on the Allegheny River 30 miles above Pittsburgh.

Ohio Marble

(from page 44)

deck usually has two sizes of openings ranging down to 3/16 inch. The two sizes of stone retained on these decks are chuted into bins. The two sizes passing through the bottom deck can be chuted into bins or discharged direct on the Low Head screen described above.

Under this plant are the original concrete bins built for the old plant. The eight compartments have a combined

Selective revolving spouts which feed from screens in flux-stone building to bins or to conveyor to road-stone building.

capacity of 1,600 tons. Cars or trucks can be loaded from all these bins. The stone in one row of bins can also be discharged on a belt-conveyor running to the concrete silos of the drying and pulverizing plant.

Two types of chutes are used in this plant. One type is the square steel chute commonly used in aggregate plants. The other is a revolving spout made of several pieces of pipe welded together. This type of spout is attached to the hoppers under the screens by means of a sealed, rubber-lined joint. Such a spout can be moved to discharge direct or through chutes into two or three bins or on belt-conveyors.

All the new buildings have bolted steel framework with Armco and Wheeling Steel Copper-Loy corrugated-metal siding and roofing. Steel doors and steel-sash windows are used. The stairs, floors, walkways, etc., are also of

The two 4- by 10-foot primary screens in the flux-stone department.

steel. What is not made of steel is made of concrete, making this one of the most nearly fireproof plants the writer has ever seen.

This plant was designed and built under the supervision of L. E. Townsend, superintendent. The new screens used were supplied by the Simplicity Engineering Company. The Jeffrey Manufacturing Company supplied the new bucket-elevators, the belt-conveyors and electric vibrating feeder. Steel for the building was designed, fabricated and erected by the Champion Bridge Company.

The company had operated a pulverized-limestone plant since 1894. When the original plant burned down in 1912 it was replaced with what is now known as the white-rock plant. This plant produces mineral dusts for cattle and poultry feeds, poultry grits, special finish material for concrete products, paint, and putty fillers. Grinding is done in a Sturtevant rock emery mill and a 4-foot by 16-foot ball-mill. Bag-packing is done mechanically. Hand-picked white stone for this plant is hauled from the quarry in a 1½-ton Ford truck.

The larger drying and pulverizing plant was built in 1926. This plant has also been kept up-to-date and was enlarged in 1936 by the installation of a third tube-mill. Other equipment includes a rotary drier, Tyler Hum-mer screens, 2 Sturtevant mechanical separators, and bag packers. The products include those made in the smaller plant plus agstone, roofing filler, etc.

Cement, Quarry Section at Safety Congress

Announcement has been made of the program of the Cement and Quarry Section in connection with the National Safety Congress to be held at the Stevens Hotel, Chicago, October 7-11.

The Cement and Quarry Section will meet on October 9 and 10, with General Chairman P. N. Bushnell (Missouri Portland Cement Company) presiding at the sessions. A. J. R. Curtis (Portland Cement Association) will make an analysis of accident experience at the opening session and G. E. Warren (Southwestern Portland Cement Company) will lead a panel discussion on "Physical Control of Accident Hazards."

After luncheon on Thursday, October 10, R. B. Fortuin (Pennsylvania-Dixie Cement Corporation) will lead a panel discussion on "Creating a Safe Working Force."

The U.S. Lime Company of Sonora, California, has acquired another lime deposit at Nixon, Nevada, and will shortly erect a plant on the property, it is reported.

PULVERIZED-COAL FIRING OF ROTARY LIME KILNS

By "CALX"

WITH the advent of the rotary kiln for the burning of lime it became apparent that some continuous method of generating heat other than the hand-fired furnaces so long associated with vertical-kiln practice would be required. Periodic firing of the vertical kiln was satisfactory, because the drawing of the lime was likewise performed at regular intervals. The stationary gas producer, still used in some districts, offered the nearest approach to a solution, but, about that time, the first automatic machines for gasifying coal made their appearance, and, carrying the advantage of continuity, they were rather generally adopted. Naturally, they were crude, troublesome affairs, when compared with the highly-efficient units available to-day, but at any rate their use was a long and daring step forward. Later other devices for the utilization of oil, pitch, natural gas, and petroleum coke as fuel came into use. Oil and pitch proved rather expensive and in some instances spotted the lime. Natural gas carried the greatest possibilities, but only in rare cases was the necessary volume available. Petroleum coke is possibly the perfect fuel, but again cost and scarcity made its use prohibitive.

Therefore, the field was left pretty generally to the automatic gas producer which served adequately for many years. The idea of noncontamination of the finished product by coal ash carried advertising value in a market accustomed to the product from upright kilns, and at the same time appealed strongly to the lime manufacturer. Also the long, rolling flame produced from high-volatile coal was thought to have advantages, so the automatic gas producer was said to be ideally suited to the burning of lime in rotary kilns.

However, as the demands for lower production costs and greater output became more insistent, blast pressures increased apace. Machines that were designed to gasify 25 to 30 tons of coal in 24 hours of operation were called upon to gasify 50 to 55 tons of coal. Gas producers, originally equipped with 3,000-cubic foot blowers, were fitted with 5,000-cubic foot fans, and blast pressures rose to 12 and 15 inches so that, in effect, units for the gasification of coal became Dutch ovens. As exit-gas temperatures increased, combustion took place in the gas ducts, the flame shortened with impingement, adversely affecting the refractory lining in the kiln. In some instances, where run-of-mine coal, after having passed through a crusher, was fed to the gas producer, the finer particles would be caught in the high-velocity bottom blast before it could reach the distillation zone and would be carried through the gas-exit flue only to be dropped near the discharge end of the kiln in the form of coke, the presence of which caused endless embarrassment and trouble in all the succeeding phases of the operation.

Then, there was the periodic cleaning of the gas mains, which was always laborious, and resulted in substantial production loss and lime contamination. The severity of the service soon reflected itself in mounting producer-maintenance costs. All this, coupled with the inflexibility and slowness to respond to adjustments, necessitated by constantly-changing conditions in the kiln, made the gas producer unsuited to the requirements of modern rotary-kiln practice.

It is not the purpose of this article in any way to belittle the gas producer, as we are well aware of its wide successful usage where extreme purity of the finished product is paramount. In the recausticising of lime sludge, for instance, where fixed production rates at comparatively-low temperatures are in order, gas-producer practice continues to be satisfactory. However, in such a procedure the variables of lime production on a commercial scale are not present.

The lime industry is undoubtedly entering a new era. However seemingly-severe have been the requirements of industries served by the lime manufacturers in the past, these will prove to be relatively mild when compared with the demands that will be made in the future. Control of quality plus flexibility of production are the prime requisites of modern lime production, and pulverized coal as fuel seems to lend itself admirably to these requirements.

In recent years the apparent advantages of direct firing with pulverized coal seem to have overcome the fear of ash contamination and product discoloration, which have in the past prejudiced many operators, and the trend now seems to be definitely in that direction. It is rather difficult to understand why the industry has looked hopefully to the unit pulverizer for an improved lime-to-coal ratio, but it apparently has. Possibly the academic thought that the use of coal slack would carry a price advantage over prepared sizes was responsible for the idea. Disappointment must necessarily attend such installations, because while almost any fuel can, when properly harnessed, generate heat of sufficient temperature to bring about the disassociation of limestone, the control and conservation of such temperatures once generated is where we must look for those 16- to 20-per cent. coal-input stories which are being so widely discussed.

There are a large number of mills from which to make a selection, and a great amount of experience in the handling of pulverized coal in other fields is available. However, as application to the burning of lime is still comparatively new, some of the important factors for consideration are herein set down.

Power Requirements.—Generally speaking, the power requirements of any coal-pulverizing equipment, which always includes a blower, will substantially exceed the power consumption of a gas-producer installation. This is naturally a point of vital interest. Twenty kilowatts per ton of coal pulverized to a fineness of 90 per cent. through a 200-mesh sieve is a good figure at which to aim. This rate, however, is contingent on a Hardgrove grindability of 75 or better and ample heat for mill drying up to 6 per cent. moisture in the coal must be available. Care should be taken not to allow load conservation to restrict that power reserve upon which depends the flexibility absolutely necessary when operating rates, in order to meet production schedules, are increased as much as 100 per cent. in a few hours. Within the writer's knowledge of the older types of plants such a range is unheard of, but in the more modern installations it is practiced regularly with only a very slight efficiency drop.

Reliability.—In the older cement practice of pulverizing coal during periods of off-peak demand for storage and later consumption an opportunity for regular inspection and repairs was afforded which simplified the maintenance factor. However, under the direct-firing system the coal mill must be capable of continuous service for periods often exceeding 6 months. This means ruggedness of construction, a high degree of mechanical proficiency, and simplicity of design, which allows quick and easy accessibility to all parts, must

be incorporated, if the pulverizer is to be satisfactory.

Maintenance.—It is quite difficult to give definite coal-mill maintenance figures because of the wide difference in the grindability of coals. Some mills have been known to require from 18 to 25 cents per ton of coal pulverized, which, of course, is prohibitive, whereas other mills function over periods of years for 2 to 3 cents per ton, which includes, not only grinding media, but all parts of the pulverizer subject to wear, fan and feeder included. In one actual operation 75 Hardgrove bituminous coal was pulverized for a total replacement cost of between 0.5 and 0.75 cent per ton.

Sound-Proofing.—One of the outstanding accomplishments of modern mill engineering is the elimination of grinding roar in the coal mill. The writer has been in some coal-houses where the sound of the mills was deafening, and conversation was carried on largely by sign language. Such a condition surely is detrimental to the health and efficiency of those exposed to it and need no longer be tolerated, because science has brought to the pulverizing of many materials (including coal) mills which operate with only a faint sound. The silencing of pulverizing units has far-reaching effects.

Coal Drying.—In no instances within the writer's knowledge have driers been installed for the removal of moisture from the coal prior to milling. The reason for this is that the small quantity of coal to be pulverized can normally be dried in the mill by piping the primary air from some point about the discharge end of the kiln, where satisfactory temperatures are available. For reasons of safety coal-mill temperatures are limited to about 250 degrees F., and, to obtain accuracy of control, a damper for the admission of tempering air is always provided. Furthermore, temperature-control devices would, of course, be installed as a safeguard against thoughtlessness or carelessness on the part of the operator.

Most operators are familiar with the start-up period, when sufficient heat for drying the coal is not available from the kiln. The difficulties which ensue can be minimized by providing a bare space—the duct is usually insulated—in the hot-air pipe, where an air-induced coke fire or large kerosene torches can maintain a cherry-red temperature on the walls of the duct. Where city or natural gas is available, a torch inserted in the duct at a safe distance from the suction side of the mill is a help at such times. There are a number of such aids in which the danger of fire is very remote because of the dampness of the coal. However, the necessity for using washed coal, which often carries moisture in excess of 12 per cent., presents an unusually difficult but not insurmountable problem. Naturally, increasing the temperature of the primary coal-carrying air is conducive to explosion. In such instances it is recommended that an insulated duct, equipped with expansion chambers or cyclones for dust removal, be installed so that the kiln exit gases can be drawn to the coal mill. By this method it is possible, with the aid of a damper near the mill inlet, to obtain 8 or 9 per cent. CO_2 in the primary air, which will allow the use of temperatures substantially higher than would otherwise be permissible, and at the same time preclude the danger of explosion, because the quantity of CO_2 specified will not support combustion. The use of such a high percentage of CO_2 has no detrimental effect upon the flame. On the contrary, it will tend to lengthen and mellow it.

Coal-Mill Feeding.—One of the greatest advantages favoring the use of pulverized coal over other types of fuel is the accuracy in the control of kiln conditions which is made possible by modern feeding methods. At this point in the process there are many variables which tend to alter the rate of pulverizing. For instance, in the most carefully designed feed bin there is likely to be segregation of coal. If the feeder is of the volumetric type, the changing of size from fine to coarse and *vice versa* will have a decided effect upon kiln conditions. Moisture in the coal may cause arching in the feed bin with an actual stoppage for a period of time of the flow of coal to the feeder, which will result in a shortening of the flame with disturbing effect. Changing bin pressures usually have an upsetting effect, sometimes increasing or decreasing, as the case may be, the rate of feed. As we are striving above all things toward the production of perfectly-burned lime, constancy of coal feed is of utmost importance. Even when direct current with its precision of movement is used for power in connection with volumetric, oscillating-pan or table-type feeders there are too many variables present to allow the desired fineness of control. Not only must great accuracy accompany the feeding of coal to the mill, but broad flexibility is also essential, if unvarying temperatures are to be maintained. The vibrating feeder is perfectly adapted to this work, being capable of an extremely broad range in the feed rate, with a delicacy of control which is unequalled, and an accuracy which boasts of a variation tolerance of under 10 pounds, when feeding at rates up to 8,000 pounds per hour. However, to insure continuity of movement from the coal-feed chamber a vibrator should be attached to the side of the bin just above the point of exit. This will largely eliminate arching and will aid in maintaining a constant pressure of coal at the discharge point.

Coal Fineness.—With the advent of pulverized coal as the prime fuel in rotary lime kilns a divergence of opinion existed concerning the fineness to which the coal should be ground. Some authorities thought extreme fineness unnecessary, and gave as their reason a longer flame resulting from slower ignition of the coarse particles. The fact that the coarse particles usually dropped out of the air stream immediately upon leaving the coal pipe was supposed to make no difference, because the temperature of the lime into which it fell would be ample to complete the combustion and the heat derived therefrom would be very effective. This, however, was somewhat in error, because coke to contaminate the lime being discharged from the kiln invariably resulted. The other school of thought concurred in that extreme fineness has a tendency to hasten combustion and shorten the flame, but thought there would be less possibility of lime discoloration by ash deposition and that a longer flame under better control could best be obtained through a deficiency of primary air, and it seems that the most satisfactory results have been obtained under this practice. The theoretical figure of 20 per cent. primary air is what most coal-pulverizing equipment manufacturers have worked toward. There are some units, however, that require as much as 35 per cent. of the total air required for combustion to get the coal out of the mill. Under such circumstances, a short flame burning constantly against the coal pipe can be expected. On the other hand, with some types it is possible to force the coal into the kiln with as low as 12 per cent. on the primary side. This is the theoretical ideal which should, with other factors being equal, give the perfect flame. In this connection many of the coal companies have advocated high-volatile bituminous as being conducive to the longest flame, whereas quite the opposite usually proves to be correct in modern lime-burning technique, coals as low as 20 per cent. giving a much longer flame.

One of the strongest arguments favoring finely-pulverized coal—90 to 95 per cent. passing the 200-mesh sieve—is its importance as a factor contributing to the formation of fire rings. A more complete discussion of the subject will follow.

Coal Pipes.—Coal pipes correctly designed are of very great importance in the satisfactory use of pulverized coal as fuel. It is comparatively simple to install the proper size of pipe to assist in obtaining the desired air velocities, and the theories concerning the advantages of this and that type of burner are

numerous, but these features seem of minor value when compared with the advantages of coal piping, constructed to give maximum practical flexibility. The decision of the operator to use ordinary iron pipe, a water-cooled nozzle, or an expensive chrome-nickel-steel burner must result from experience with local conditions, but the "smart" thing in any event is to obtain experienced advice concerning the possibilities of a flexible burner. By a flexible burner is meant one that can be lengthened or shortened 5 or 6 feet quickly and with the least amount of help; one that has an easy radial movement of at least 18 inches in all directions from the axis of the kiln; one that can be removed and replaced with an operation interruption of less than half an hour.

With such flexibility most of the variables encountered in the every-day operation of the rotary lime kiln can be provided for, and a more accurate control of output is assured.

Fire Rings.—Fire rings have been forming in rotary lime kilns since the beginning of their use. Their extent, size, density, rapidity of growth, and cause differ so widely that no one formula is applicable to all operations. The fact that they are troublesome is the only factor common to all formations. With the advent of pulverized coal as fuel the situation has become so acute that the success of the venture may be said to rest on this one point. Some operators who have installed pulverizing mills are so genuinely concerned that they are considering other types of fuel or the removal of the mills altogether, while others, who are still using different types of equipment, but who are convinced of the economy, flexibility, and control features possible with pulverized coal, hesitate in making the change because of the trouble being experienced generally. To the question, "Can the formation of fire rings be eliminated or controlled," the answer is emphatically "Yes." A discussion of causes and corrective measures follows. It must necessarily be broad because it is a problem with many approaches.

Proper Sizing at the Feed End of the Kiln.—Most operators of rotary lime kilns are staunch believers in feed uniformity, but for one reason or another do not practice it. They may give as their reasons "inability to dispose of odd sizes," "insufficient screening equipment," "storage facilities unsuitable," "wet screening," "inability to dry properly," "bad weather," all of which are "old stuff." If the urge to accomplish is strong enough, a method can and must be found if his difficulties are to be remedied. If it is dry screening, dry thoroughly and screen accurately. If it is wet screening, wash thoroughly and screen accurately.

Common practice is to divide the stone ranging from ¼ inch to 2½ inches into two or maybe three sizes and feed it to the kiln as such, whereas to obtain a thoroughly, but mildly, burned lime product of the best possible quality such a range should be broken into at least 7 sizes. On the contrary, when a wide size range of stone is fed through the spout, the operators can expect the smaller ranges to be augmented by breakage occurring in the kiln where two separate actions follow: (1) the thin slabby pieces of stone will remain on the bottom of the charge, sliding on the lining with little chance of exposure to direct radiation; (2) the smaller sizes of cubical stone will form a perfect core in the center of the rolling charge with little chance of absorbing heat either from direct radiation or transfer from the kiln lining. The inevitable result is overfiring in order to minimize the $CaCO_3$ always occurring in the small particles at the discharge end of the kiln. Overfiring carries penalties in the form of greater fuel consumption, lime discoloration, retarded slaking, faster settling rate, reduced putty yield and, last, but of major importance, it is conducive to the formation of fire rings.

In order to remove every trace of dust from the stone feed it has been common practice for a number of years to place a vibrating screen just ahead of the feed pipe, because it was believed that dust and extremely-fine particles of material carried forward with the charge slagged to the lining at the hot point more readily than stone of normal size. This is quite true, but ordinarily the dust occurring at the feed point, if the prior screening has been fairly efficient, is rather small in quantity when compared with the breakage which takes place in the kiln after the charge has been exposed for the first time to the relatively-high temperature of the feed end, more especially if several per cent. of moisture is present in the stone. This condition is naturally aggravated where heat exchangers are employed, and the added length of the newer kilns increases proportionately the tendency to great attrition. The French coëfficient of the stone, as indicated by a Duval abrasion test, will give a fair indication of the normal breakage to be expected in the kiln. Therefore, the value of fine screening at the point of kiln entrance is questionable. The presence of a fairly great quantity of fine lime at the kiln exit—sometimes up to 25 per cent.—may present a marketing difficulty, but if the kiln is not overfired, it need not be a cause for fire rings.

Impurities in the Kiln Feed.—The chief offenders in the formation of a fire ring are silica, iron and alumina. These are usually present in the limestone as well as the coal ash, but, for the moment, we will discuss only the impurities in the kiln feed. By melting any of these three minerals, that is in the pure state, it will be found that very high temperatures will be required, much higher in fact than those used in the disassociation of limestone. However, if a flux is added, they become sticky at approximately 2,450 degrees F., which is directly in the range of rotary-kiln flame temperatures. It is, therefore, this stickiness which lays the foundation for an accumulation of the fine particles in the charge, which, when deposited layer upon layer, ultimately develops into a full-grown fire ring. Greater accuracy of feed sizing within closer limits will allow the reduction of calcining-zone temperatures to a range below the sticky point of the impurities, and fire rings will largely disappear.

Analysis of the Slag Ring.—An average analysis of fire-ring slag, formed while using a medium volatile coal from central Pennsylvania, shows:

Fire-Ring Slag		Coal Ash
SiO_2	9.36 per cent.	50.56 per cent.
Al_2O_3	4.18 " "	37.27 " "
Fe_2O_3	1.48 " "	4.32 " "
CaO	84.88 " "	2.68 " "
P_2O_5		.69 " "
MgO		.42 " "
SO_3		2.76 " "
Alkaline Oxides		1.30 " "
Phosphorus in coal		.015 " "

Dust in Primary and Secondary Air.—In many installations the kiln hood is the source of preheated primary air. This, it would seem, is the logical area from which to obtain warm air for drying the coal in the mill because of its proximity. However, the kiln hood is usually a point of great air turbulence, because of the entrance of the secondary air through the discharging lime, the effect of which is likely to allow quantities of fine dust to be drawn into the warm-air duct. Whether the warm air is obtained from some point about the settling chamber at the feed end of the kiln or the hood, an expansion chamber or cyclone should be placed at a convenient point in the duct for the efficient removal of dust, because it is evident the fine air-borne particles of lime are deposited directly on the sticky section, where they undoubtedly remain to increase the bulk of the fire ring. A curve prepared by engineers of the Pittsburgh & Rochester Coal Company to indicate the effect of dust on a fire ring is shown in Figure 1.

In modern rotary-kiln practice the after-cooling of lime performs a dual service. Not only is the lime reduced to a temperature at which it can be handled and stored, but passage over the moving charge allows a substantial increase in air temperatures which lends

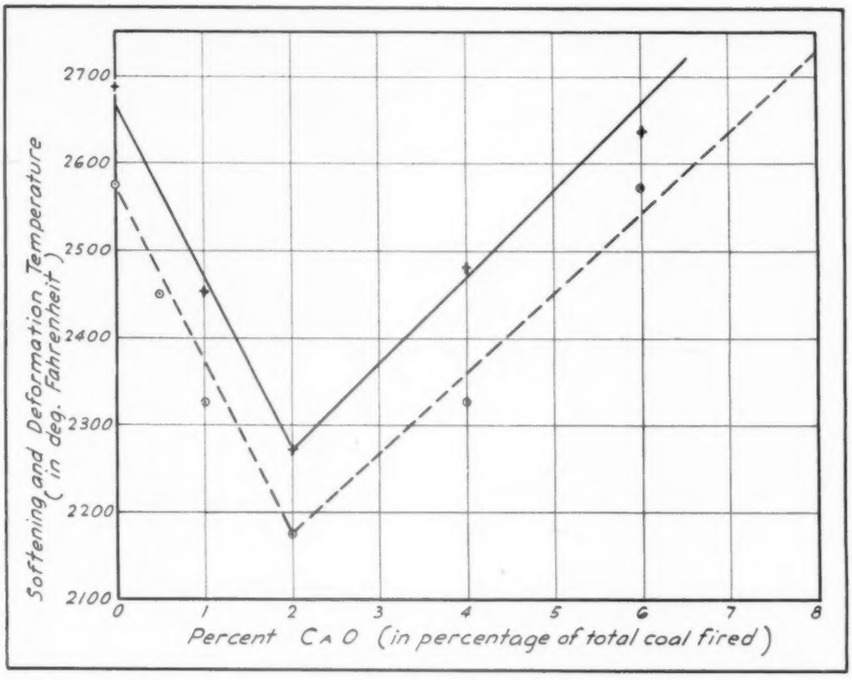


Figure 1. Chart showing effect of various percentages of lime dust from primary and secondary air with coal in suspension, and softening temperature of the mixture.

itself advantageously in the new drive for economy. But at the same time, in a number of instances, air velocities are great enough to allow the return of much very fine lime dust to the combustion area of the kiln, where it, too, joins in the formation of the fire ring. The fine particles thus deposited are the cause of the close-grained extremely-hard fire rings that seem stubbornly to resist our best efforts at removal periods.

Flame Placement.—As mentioned in a preceding paragraph, a flexible coal pipe can be of great assistance in placing the flame to the best advantage. Not only can the flame be placed directly on the lime charge, thereby lessening to some extent the tendency to superheat the brickwork at the point of impingement, but, by a longitudinal movement of the burner, the hot spot can be altered occasionally and the ring formation consequently allayed. This procedure, in conjunction with the use of coal containing approximately 20 pounds of ammonium sulphate per ton, will have the effect of loosening slag which has already formed. Thus, by regularly altering the hot point it is possible to loosen slag at one extremity while it is being formed at the other. It should be understood that the corrective and preventive measures suggested herein are based on the use of pulverized bituminous coal as fuel. Where fuel oil, petroleum coke, or natural gas is employed, troublesome slag rings are unknown.

Slag-Ring Prevention by the Use of a Basic Refractory.—At this writing two rotary kilns, in which the formation of fire ring has been quite pronounced, are planning the installation of a section of magnesite lining backed by clay bricks at the normal point of ring formation. It is believed to be quite certain that the tendency toward slag formation at a rather well-defined section in the burning zone can be overcome, or at least reduced, by the use of a hard-burned, low-iron magnesite brick. While magnesite linings take a good coating in service, the reaction produced between the magnesite and the charge is more refractory and would inevitably reduce the existing difficulties. Naturally, with magnesite laid directly against the shell of the kiln, there would be a much greater radiation loss and the steel shell itself would become appreciably hotter, but with 2½ inches of clay bricks laid on ½ inch of grog, the radiation losses should be comparable with those of the 70-per cent. alumina liner.

Other Methods for Removing Fire-Ring Slag.—It not infrequently happens that fire rings force a kiln off the operating line, and the losses which accompany such shut-downs are well known. One method of removal is the so-called water bar. When the obstruction is rather deep in the kiln, this system requires much room, many men, is quite clumsy of operation, and it is very evident that it is bound to shorten the life of the lining. In other cases the rings are shot out with shells. At some plants, where the problem is especially acute, it is customary to add sand to the feed occasionally. The excess silica is instrumental in removing the rings, but it also tends to remove the coating, so that the lining is then subject to the direct abrasion of the charge with the result that its life is reduced. Serious product contamination also results from such a scheme. In the sintering of ore fines, blast-furnace flue dust, and similar materials European operators have developed a very stout water-cooled boring bar which enters the kiln through the hood, and, with a scraper arrangement, cuts the crust from the lining without interfering with the operation of the kiln. It may be, in order to obtain relief, that something similar to this will have to be developed for slag removal in lime kilns.

Coal.—Pulverized coal in suspension is an excellent fuel, meeting many of the variable requirements for the calcining of lime, but, notwithstanding its many idiosyncracies, challenges the resourcefulness of most operators. There is little question, but that coal ash is the heaviest contributor to the rotary-kiln operator's difficulties herein discussed. The theorist likes to think about burning lime with temperatures under 2,000 degrees F., and we can all readily appreciate the many benefits that would accrue, but unfortunately economic conditions exist which make it vitally necessary to use such fuels as are at hand. Certain advantages can be claimed for high-volatile versus low-volatile coal, or *vice versa,* but here again accessibility to either may be an important cost factor. It seems to resolve itself down to the ability to modify the explosive tendency of finely-divided coal. If this is possible, flame temperatures will be held on the safe side of the ash-fusion point, and fire rings will probably disappear. An operator recently told me he used 50 per cent. of his total air required for combustion on the primary side. Many operators will do well to study the quantity of air being used to dry the coal and get it out of the mill. The percentage will probably surprise them. Much in the way of flame-temperature modification can be accomplished by working toward the irreducible minimum, which should be around 12 per cent. Also, the admission of the preheated secondary air at a point 25 or 30 feet from the discharge end of the kiln should modify and lengthen the burning action. Another theory suggests the determination of the pounds of coal ash entering the kiln per minute and the exact weight of the dust entering via the primary and secondary air. When these quantities are known, enough limestone can be added to the coal just ahead of the unit pulverizer to neutralize this and produce an ash content having a fusing point above that of the highest temperature attained in the burning zone of the kiln. Theoretically this will succeed; actually it will fail in part, because it is impossible

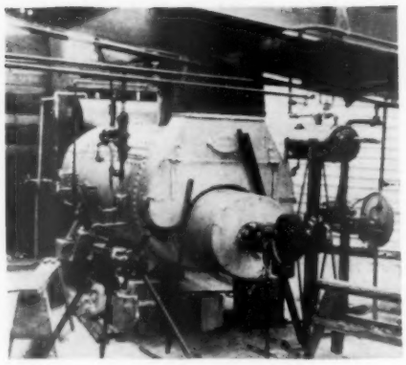
to get the limestone into sufficiently intimate contact with all the low-fusing dust particles and keep the contact until they have passed on to the mass of material being burned, or to a point beyond which they would fuse.

In addition to the ring-forming characteristics of coal ash some complaint is heard concerning the discoloration of the lime by a deposition of ash. Much laboratory work has been done in this connection with these conclusions. A particle of lime and adhering stain is first heated to a high temperature upon the assumption that, if the stain were carbonaceous, the carbon will be burned off and the discoloration disappear. On this test the blackening does disappear but a typical red ferric-oxide (Fe_2O_3) scale remains. This indicates that the stain is ferrous oxide (FeO), which would be expected in a highly reducing atmosphere in a kiln and which, when further heated in the atmosphere, changes to the more stable compound, Fe_2O_3. It is probable that the formation in the hot zone is almost pure iron, and as it passed into the cooler zone it takes on a thin coating of FeO which gives the formation a blackish color.

Upon dissolving the particle in dilute hydrochloric acid the typical ferric-chloride color develops and its essential nature is further confirmed by potassium thiocyanate and ferri-cyanide tests, each of which is highly sensitive and specific.

Larger pieces of the quicklime are then selected and the scale scraped off with care to remove as little as possible of the underlying lime. By this means a relatively-high concentration of the material is secured. The thiocyanate and ferri-cyanide tests are repeated and very strong shades of the characteristic colors develop.

The precaution is observed of similarly treating equal quantities of the clean lime just under the scale thus removed, in order that assurance can be had that the slight iron content of the lime is not responsible for the color reactions. It is entirely probable that the scale contains certain amounts of the other minerals inherent in coal ash, but it is certain that the black or brownish color is entirely due to iron.



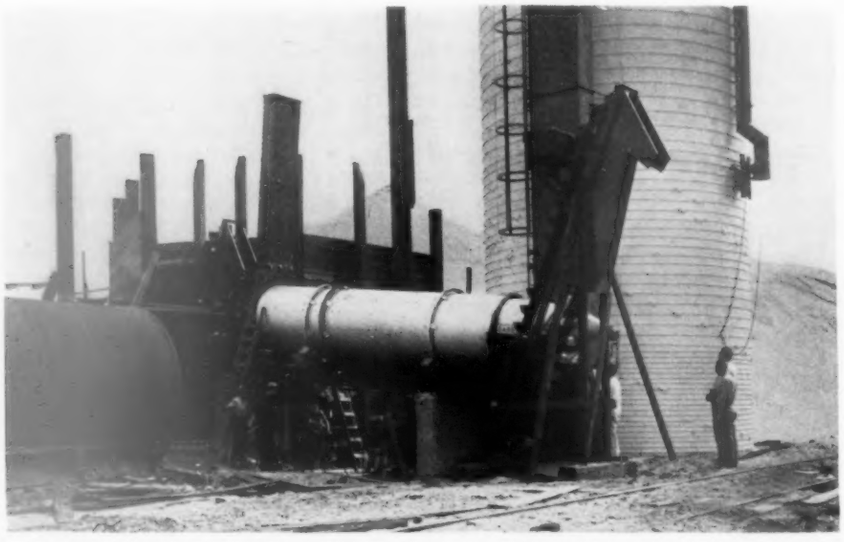
Oil burner and automatic steam boiler.

Installs Oil-Fired Rotary Drier for Foundry Sand at Plant in Cleveland

The Sand Products Corporation of Detroit, was recently faced with the problem of producing dry foundry sand at its plant in Cleveland. Facilities for storing this sand and loading it into railroad cars or trucks were also needed. The problem was solved by the installation of a Barber-Greene standard portable rotary drier mounted on wheels of the type which is ordinarily used for road construction work. A concrete-stave storage silo was also erected and Barber-Greene feeders and elevators installed. The completed installation reduces sand with 3½ per cent. of moisture to a "bone-dry" state at the rate of 40 tons per hour.

At this plant two grades of sand, coarse and fine, are unloaded from self-unloading boats on the Cuyahoga River and stored in stock-piles separated and retained by wooden bulk-heads. Two Barber-Greene reciprocating-plate feeders deliver these sands separately or in any desired proportions from these piles to a belt-bucket elevator feeding the Barber-Greene direct-fired rotary drier. The dried product can be discharged either to a short belt-bucket elevator for loading into cars or trucks or by a fully-inclosed elevator into the 18-foot diameter by 49-foot Marietta concrete-stave storage silo which has a capacity of 350 tons. This elevator can also be fed from the silo and a split chute and a vertical spout down the side of the silo makes it possible to load from dead storage into cars or trucks if necessary. Loading from live storage in the silo is done through side-sliding gates controlled from the ground by chains.

The concrete-stave storage silo.



Rotary drier for foundry sand at Cleveland plant of Sand Products Corporation.

Every conceivable safety device and automatic control has been incorporated in the plant. A Leffel oil-fired completely automatic boiler supplies steam for atomizing the oil in the Houck burner which fires the drier. The boiler can be started or shut off from the office and the burner is automatically controlled at the desired pressure.

PERSONAL MENTION

B. P. JOHN has sold the former Oregon-Washington Lime Products Company quarry at Williams, Oregon, to the Washington Brick, Lime & Sewer Pipe Company, of Spokane.

T. T. LEONARD will install machinery and engage in the limestone-products business at Marquan, Oregon, shortly.

PAUL C. MILLER of Traverse City, Michigan, has purchased and installed a portable washing-and-screening plant at a sand-and-gravel deposit near that city. Initial production is being utilized in an airport development.

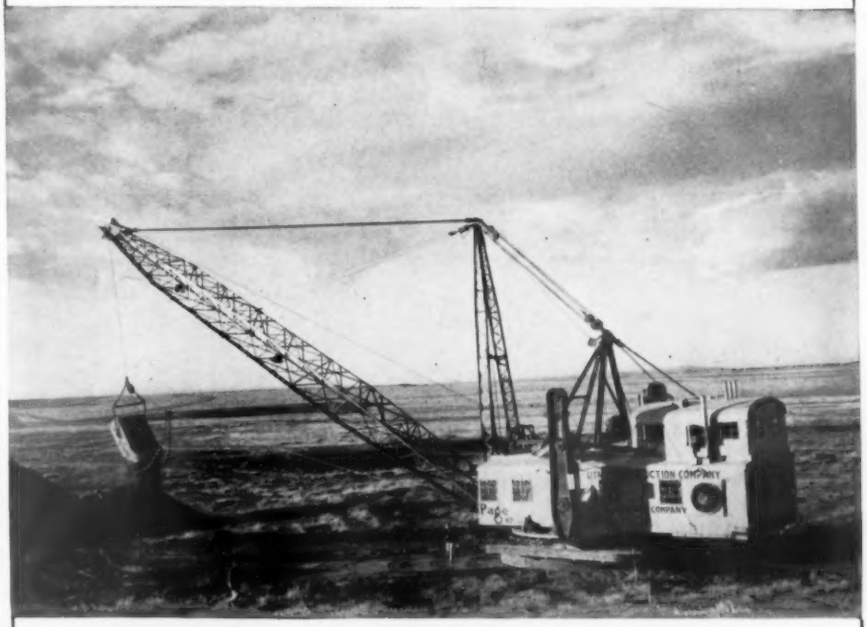
FREDERICK R. SCHULTZ, traffic manager of the Buffalo Slag Company, Inc., has been appointed to the board of managers of the South Buffalo Y.M.C.A. Mr. Schulz has taken an active interest in Y.M.C.A. work in Buffalo for several years.

ALEX W. DANN, executive vice-president of the Dravo Corporation, Pittsburgh, and a former president of the National Sand & Gravel Association, has been appointed advisor on defense transportation problems by the National Defense Commission.

William P. Laseter has been named manager of the newly-created Export Division of the John A. Roebling's Sons Company of Trenton, New Jersey. Offices of the division have been established at 19 Rector Street, New York.

PAGE TWO-ENGINE DIESEL-POWERED WALKING DRAGLINE

One engine for loading and hoisting
Another separate engine for swinging



On canal work near Tucumcari, New Mexico, Utah Construction Company and Griffith Company use this Page Walker, powered by two Page horizontal Diesels, one mounted above the other. A heavy-duty 6½-cubic-yard Page Bucket is used on a 110-foot boom.

Here is a new development in large draglines—fast hoist and fast swing at the same time! No longer need the operator delay the swing of the machine waiting for the hoisting of the bucket. Rather, with the balanced power of the Page Two-Engine Walker, acceleration of hoisting and swinging is greatly increased.

To understand this faster operation with a Page Two-Engine Walker, visualize using all of the power of your present dragline for hoisting only, without swinging the machine. You will find that the hoisting speed will be increased greatly. Now consider a second independent engine for swinging only. This second engine accelerates the swing in proportion to the faster hoist. The two engines—the large Diesel, which only hoists and loads the bucket, and the smaller independent Diesel for swinging as rapidly as the faster hoist demands—furnish perfectly balanced power and increase the number of loaded buckets that can be handled per minute. Learn what a Page Two-Engine Walker will do on your dragline job.

PAGE ENGINEERING COMPANY
Page Automatic Dragline Buckets · Page Walking Dragline Machines
CLEARING POST OFFICE, CHICAGO, ILLINOIS

NICK BURGGRAF, Idaho Falls, Idaho contractor, has opened a ready-mixed concrete plant in that city to supplement his sand-and-gravel operations.

W. J. KOEHRING, has resigned as president of the Koehring Company, Milwaukee, after 33 years of service and will act as chairman of the board. G. E. LONG, who has succeeded him as president, was treasurer since 1932. He became associated with the company in 1928, and has also acted as secretary, sales manager and general manager in recent years.

CLINTON E. STRYKER has been appointed vice-president and assistant to the president of the Nordberg Manufacturing Company, Milwaukee. Mr. Stryker was a partner in McKinsey, Kearney & Company, management engineers, of Chicago, having been with that firm for five years. Prior to that he was with Fansteel Metallurgical Corporation for a number of years in various administrative capacities. He graduated from the Armour Institute of Technology in 1917 and is a Fellow of the American Institute of Electrical Engineers and a member of the Society of Automotive Engineers.

Clinton E. Stryker

A. J. R. CURTIS, assistant to general manager, Portland Cement Association, was recently named a member of the board of managers of Lewis Institute, Chicago. With the merger of Lewis and Armour Institutes to form the Illinois Institute of Technology, Mr. Curtis has been elected a trustee of the new school. He attended Lewis, having been graduated in 1910.

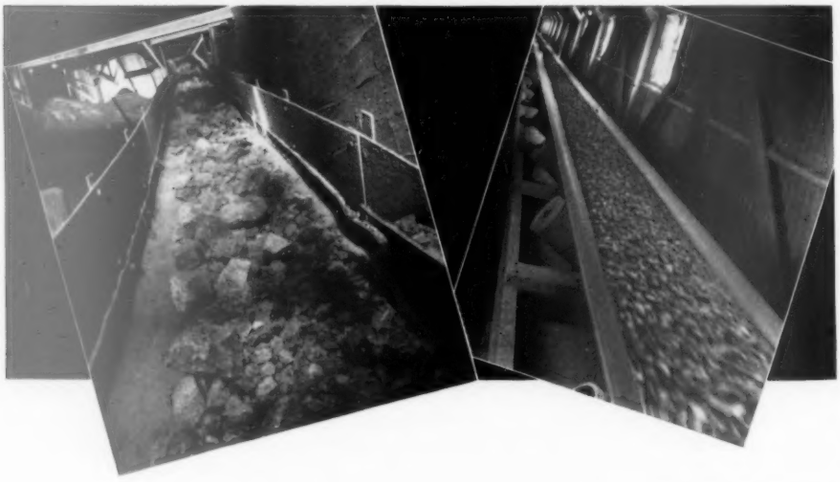
ALLEN W. Dow, formerly of A. W. Dow, Inc., has been appointed consulting technologist of the Asphalt Institute. This is a new post designed to complement the field work of the Institute's district engineers.

WILLIAM L. FEWSMITH, 61, manager of publicity and advertising for the Robins Conveying Belt Company, died after a brief illness while on vacation at Port Carling, Ontario, on August 15. He had been with the company continuously since 1913.

CHRIST HARTMANN, 39, met his death August 1 when he was crushed by a truck while at work in the Lockport, Illinois, pit of the Material Service Company, Chicago.

JACOB BRICKBAUER, 71, plant superintendent for the Crystal Lake Crushed Stone Company, until his retirement last fall, died July 12 in a Plymouth, Wisconsin, hospital. A native of Plymouth, Mr. Brickbauer had been associated with the stone company for 30 years. He is survived by a son, and three brothers.

CHARLES L. SUESSMAN, 80, former executive of the Ohio Marble Company, Piqua, Ohio, died recently at Dayton.



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AIRPORT

ZOO

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Robert S. Campbell

ROBERT S. CAMPBELL, 51, president of the Campbell Limestone Company which operates quarries and crushed-stone plants at Gaffney and Liberty, South Carolina, died of a heart attack July 18 while at Cowpens, South Carolina. His home was in Knoxville, Tennessee.

LAWRENCE C. LETZKUS, sales manager of the Columbia Cement Division of the Pittsburgh Plate Glass Company, was one of the first identified dead in the railroad disaster at Cuyahoga Falls, Ohio, in which 41 persons lost their lives on July 31.

D. S. MOONEY, 59, prominent Atlanta businessman and head of the Mooney Sand & Gravel Company of that city, died suddenly of a heart attack on July 31. He had lived in Atlanta for 30 years and also headed a contracting concern bearing his name.

H. H. HELWIG, 60, superintendent of the Metaline, Washington, plant of the Lehigh Portland Cement Company, died a short time ago. He was one of the company pioneers, having been with the Lehigh organization continuously for 40 years.

HARRY E. LEACH, a pioneer in the Mexican cement industry, died recently of a heart ailment. He left Speeds, Indiana, early in the century to become general manager of the La Tolteca Cement Company in Monterrey. Later he was in Cuba with the Cuban Cement Company, returning to Mexico in 1919 to build a plant for Cementos Mexicanos. He had been general manager of this company ever since. Surviving are the widow and two brothers, Wallace H., chief chemist of the Louisville Cement Company, and Scott, with the Diamond Alkali Company.

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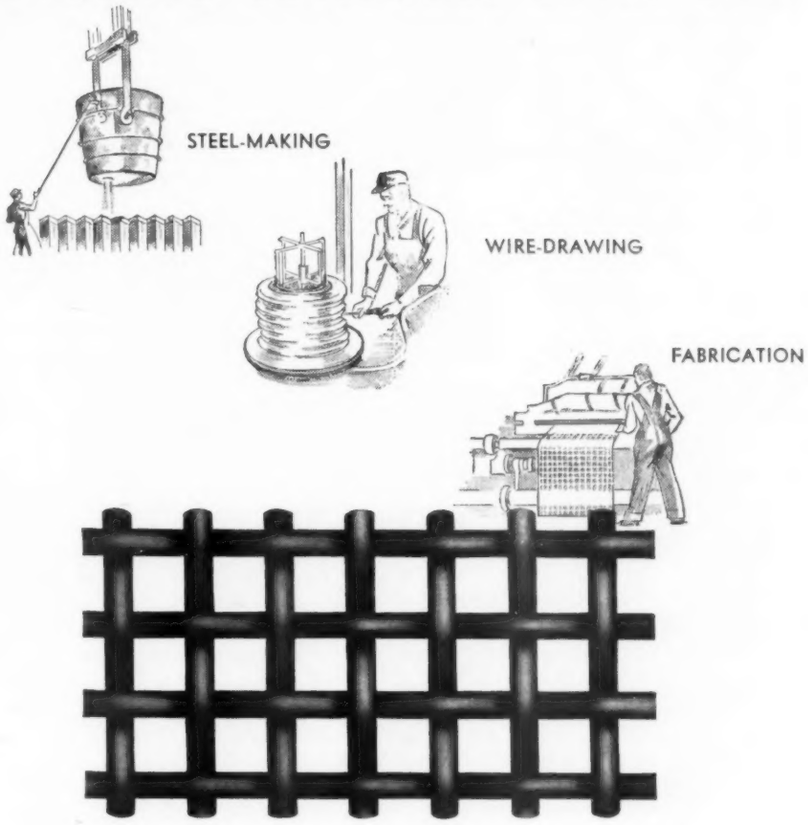

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OCCUPATIONAL DISEASES AND THE LAW

Law Change

Vandenbark v. Owens-Illinois Glass Company, decided by the U. S. Circuit Court of Appeals, Sixth Circuit, March 13, 1940; reported at 17 0.0 495.

The Federal District Court, which heard this case because of diversity of citizenship, dismissed this suit, brought to recover for occupational diseases (including silicosis) allegedly contracted by the appellant while employed in the glass factory of the appellee, on the ground that such an action could not be maintained against an employer complying with the provisions of the Workmen's Compensation Act, Section 1465-70, Ohio General Code.

At that time the decision was admittedly correct, for the diseases complained of were not compensable and the Ohio state courts had held for almost 25 years that the common-law right to recover for occupational disease contracted in the employ of those complying with the terms of the Workmen's Compensation Act had been taken away by Section 1465-70 of the General Code. Since the decision was rendered, however, the Ohio Supreme Court reversed that court ruling *(Triff v. National Bronze & Aluminum Foundry Co.,* 20 N. E. (2d) 232), and the Ohio Legislature amended the Workmen's Compensation Act by adding silicosis to the schedule of occupational diseases therein made compensable.

In this appeal the appellant sought either to have the judgment reversed on account of these changes in Ohio law, or the case remanded to the District Court for reconsideration in the light of those changes. The Court of Appeals holds, however, that since the decision was correct when rendered, and since the new law making silicosis compensable was not retroactive in operation, the judgment dismissing the suit must be affirmed.

Tuberculosis

Row v. Cape Girardeau Foundry Company, decided by the St. Louis (Missouri) Court of Appeals, June 4, 1940, rehearing denied June 18, 1940; reported at 141 S. W. (2d) 113.

This case was a garnishment action against an insurance company to collect the amount of a judgment awarded by a court of common pleas to a workman suffering from tuberculosis. The tuberculosis was allegedly brought on by the employer's nonobservance of certain statutory and common-law obligations for the employee's health and safety.

The insurance company contended that the garnishment was invalid because the Workmen's Compensation Commission, rather than the court, had jurisdiction. This contention is denied by the Appellate Court on the ground that the workman's injuries from "the continued absence of an adequate and efficient device for carrying off injurious fumes, gases and dust, and the breathing of such fumes, gases and dust" were not accidental injuries within the coverage of the compensation law.

Also, it was contended that the disease was an occupational disease, which the insurance policy did not cover. The court rules, however, that "an occupational disease is one which is the natural incident or result of a particular employment and is peculiar to it, usually developing gradually from long continued work at the employment, and serving to attach to the employment a hazard which distinguishes it from the ordinary run of occupations and is in excess of the hazard attending employment in general." Tuberculosis, however, "is not an occupational, but an infectious disease, attributable solely to the ravages of tubercular bacilli, and in no sense the natural incident of, or peculiar to, any particular character of employment." The disease is accordingly held to be within the coverage of the insurance.

Partial Disability

Moffett v. Harbison-Walker Refractories Company, decided by the Superior Court of Pennsylvania, June 24, 1940; reported at 14 att. (2d) 111.

This was a suit in tort alleging that the plaintiff's employer violated the Pennsylvania Factory Act and failed to furnish a reasonably-safe place in which to work and to warn plaintiff of incident dangers, with the result that plaintiff was partially disabled by silicosis.

The Pennsylvania Workmen's Compensation Act of 1915 (P. L. 136; 77 P. S. Section 1 *et seq.)* as supplemented by the Occupational Disease Compensation Act of July 2, 1937 (P. L. 2714; 77 P. S. Section 1101 *et seq.),* which became effective January 1, 1938, now provides for compensation for disability from silicosis. The plaintiff contended that the acts provide compensation only for total disability from silicosis and do not take away his common-law remedy for partial disability.

The court decides against that contention, holding that "the legislature intended to bring all silicosis sufferers, whether partially or totally disabled, under the act and that by accepting the

provisions of the compensation acts, an employee agreed to look solely to the act for compensation and to give up any remedy he might otherwise have had."

The plaintiff quit work after the Occupational Disease Compensation Act became effective, and by construction of the statute is held to have no common-law right of action, even though some of the injury may have been inflicted before that time.

Limitations

Bryson v. The American Tool Works Company, decided by the Common Pleas Court, Hamilton County, Ohio, June 26, 1940; reported at 18 O. O. 1.

This was an action for wrongful death, brought by the administrator of the estate of a workman who died from silicosis allegedly contracted by reason of unsafe conditions in defendant's foundry, where the deceased worked. The suit was brought within the two years after death provided for in Section 10509-167 of the Ohio General Code (actions for wrongful death), but beyond the period of 180 days after the effective date of Section 1465-70 (in the Workmen's Compensation Act), as amended in 1939, during which such actions to recover damages might be commenced. As amended in 1939, the Workmen's Compensation Act applies to injuries or death from silicosis, and any common-law or statutory right to sue for damages on such account was abolished, with a proviso that such actions might be commenced within 180 days from the date on the amendment. The amendment is held to be valid as against several constitutional objections urged, and a demurrer to the suit is sustained.

Tuberculosis

MacRae v. Unemployment Compensation Commission of North Carolina, decided by the Supreme Court of North Carolina, June 19, 1940; reported at 9 S. E. (2d) 595.

An employee of the Unemployment Compensation Commission of North Carolina, working across a narrow table from a fellow worker afflicted by tuberculosis, contracted the disease, and proceeded against the employer, under the Workmen's Compensation Act, to obtain compensation for the resulting disability.

The Industrial Commission awarded compensation, and that award is affirmed in this appeal. The disease is not an occupational disease (compensable under Chapter 123 Laws of 1935), that is, a disease resulting "from the cumulative effect of long, continued exposure to risks and conditions inherent and usual in the nature of the employment." In this instance the disease is held to be the result of an "injury by accident" within the scope of the Workmen's Compensation Act, and the award was made and affirmed on that ground.

TRADE NOTES

Offices of the Pulverizer Parts Replacement Company, Chicago, have been moved to 2948 West Washington Boulevard.

Bay City Shovels, Inc., announces the appointment of T. R. Hall, Jr., Burlington, North Carolina, as district manager and factory sales representative in Virginia, Tennessee, North and South Carolina and Florida.

The John A. Roebling's Sons Company is opening a new branch office and warehouse in Houston, Texas. R. A. Hill, formerly mid-continent manager for the Regan Forge & Engineering Company, has been appointed manager.

The Harnischfeger Corporation of Milwaukee announces the appointment of the Shaw-Newlin Company, South, Chillicothe, Missouri, as exclusive agents for Models 100, 150 and 255 in the P&H excavator line.

In order more closely to identify the De La Verge Engine Company with the Baldwin Locomotive Works of which it is a wholly-owned subsidiary, the name De La Vergne Engine Company has been changed to Baldwin De La Vergne Sales Corporation.

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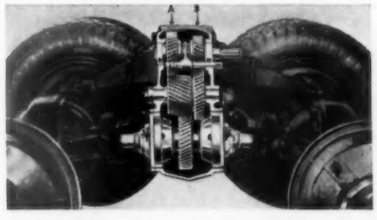

THORNTON two-speed transmission cut away to show the two trains, A and B, massive helical gears — one ratio for power and the other for speed — easily controlled by a lever in the cab.

Two ratios, for power and speed. Walking-Beam Flexibility—Special spring construction keeps equal load on all four driving wheels—Perfect balance between power and weight.

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Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL which gives traction when slippery going makes trucks equipped with ordinary differentials helpless.

"When you need TRACTION you need THORNTON"

LABOR DECISIONS

Contract

Bussman Manufacturing Company, et al. v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Eighth Circuit, May 14, 1940; reported at 111 Fed. (2d) 783.

The employer in this case recognized as its employees' bargaining agent and made a contract with an association of all its employees. The National Labor Relations Board found that the tool and die makers were an appropriate unit for bargaining purposes, and that the employer had violated the National Labor Relations Act by refusing to bargain with a union representing those employees. That finding is sustained by the court.

It was contended that enforcement of the board's order (requiring the employer to bargain with the union) would impair the obligations of the contract between the employer and the association. This claim is held to be without merit, because: "It is not denied that the local [union] represented a majority of the tool and die makers and the apprentices at the time the employer refused to bargain collectively with them. That was an unfair labor practice, and the making of a contract subsequently with the association does not relieve the employer from the consequences of its refusal."

It is also noted that if the tool and die makers and apprentices desire to recognize the association instead of the union as their collective-bargaining agent, the order does not prevent them from doing so.

Facts Needed

Jacobs v. Peavy-Wilson Lumber Company, Inc., decided by the U. S. District Court, Western District of Louisiana, Shreveport Division, May 14, 1940; reported at 33 Fed. Supp. 206.

In this suit the acting administrator of the Wage and Hour Division of the U. S. Department of Labor seeks to enjoin the defendant from violating the Fair Labor Standards Act of 1938, it being alleged that the minimum-wage provisions are violated through excessive charges for employees' living quarters, food, medicine, etc., and through the discounting of scrip issued in lieu of cash wages.

The defendant company contended that definition of "wage" to include board, lodging or other facilities furnished to employees (Section 3 (m)) does not apply to it, or (if it does) is unconstitutional. The court reviews a series of cases holding specific provisions to be constitutional, the sum of these decisions being "that substantially the whole act has been maintained." The constitutionality of the phrase "board, lodging, or other facilities" as interpreted to include "medicines and drugs, clothing, groceries, foodstuffs, meats and other commodities" has not been decided. However, since there is a strong presumption in favor of the constitutionality and validity of an act of Congress and of administrative interpretations, the court in this case reserves a decision until all the facts are developed in the trial on the merits.

A motion for a bill of particulars is denied on the ground that the information sought is peculiarly within the defendant company's knowledge (its own books and records) so that it could hardly be surprised at trial.

Contract

Emerson v. Mary Lincoln Candies, Inc., decided by the New York Supreme Court, Erie County, May 25, 1940; reported at 20 N. Y. S. 570.

The decision reported here is an opinion and judgment by an official referee awarding to plaintiff additional pay, doubled, for overtime work. On several controversial points the referee ruled: that Section 7(a) of the Fair Labor Standards Act of 1938 made it compulsory for the employer after October 24, 1938 (effective date) to pay for all overtime worked over 44 hours per week at time-and-a-half regardless of the terms of a contract under which the employee was then working; that the additional equal amount provided for, being liquidated damages rather than a penalty, may be recovered in a state court; and that the awarding of the additional equal amount is mandatory rather than discretionary with the court.

Maintenance

Killingbeck et al. v. Garment Center Capitol, Inc., decided by the New York Supreme Court, Appellate Division, First Department, June 7, 1940; reported at 20 N. Y. S. 521.

The plaintiffs in this case were a watchman and a carpenter employed by the owner of a building occupied by tenants who produced goods for interstate commerce. They sought to recover wages for overtime and liquidated damages pursuant to the Fair Labor Standards Act of 1938. It was not contended that the plaintiffs were engaged in producing the goods destined for interstate commerce by the tenants who occupied the building, but that they were engaged in a "process or occupa-

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tion necessary to the production thereof." That contention, says the court, "can not be sustained without subjecting to the provisions of the act industry which is plainly intrastate in character and without engendering doubts, to be avoided, if possible, concerning the validity of the law."

The court holds that the statute does not include such maintenance employees when they are not the employees of a manufacturer who is engaged in interstate commerce, and recovery under the act is denied.

Penalty

Anderson v. Meacham, decided by the Court of Appeals of Georgia, Division No. 1, February 28, 1940, rehearing denied March 30, 1940; reported at 8 S. E. (2d) 459.

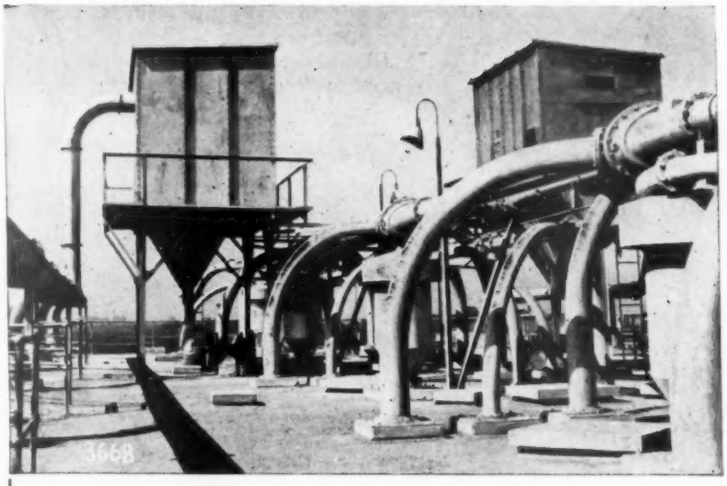
An employee of a gristmill operator sued to recover from his employer pay for overtime, the balance between his actual wages and the minimum wages pursuant to the Federal Fair Labor Standards Act of 1938, and an equal sum as a penalty pursuant to that act. The trial court sustained a demurrer, and that action is affirmed by the appellate court, on the ground that the action was for a penalty incurred under the laws of the United States, a matter over which the Federal courts have exclusive jurisdiction. "The fact that the employee may bring his action for an additional equal amount as liquidated damages is nothing more or less than a penalty fixed and incurred under the laws of the United States."

A still stronger reason for sustaining the demurrer, says the court, is that the employee of a gristmill, under the conditions prevalent in Georgia, is an individual employer within the area of production, engaged in handling, etc., an agricultural commodity and hence exempted by the terms of the act itself from the hours and wages provisions.

Independent Union

National Labor Relations Board v. Brown Paper Mill Company, Inc., decided by the U. S. Circuit Court of Appeals, Fifth Circuit, January 17, 1940; reported at 108 Fed. (2d) 867.

The National Labor Relations Act, says the court, does not compel employees to affiliate themselves with existing national or other unions or associations, nor does it prevent them from forming truly independent local associations of their own. "But it does prevent and prohibit the formation of associations of employees for bargaining purposes which, though they are ostensibly independent, are really supported, controlled or influenced, though ever so slightly, by the management."



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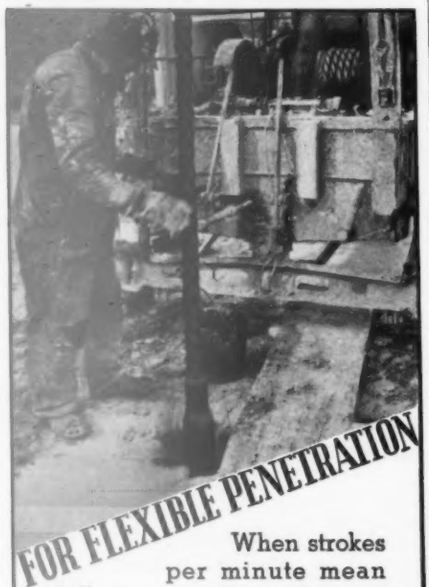

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And "when, as here, at the beginning of an organizational campaign by a nationally affiliated labor union, the management frankly declares that it never has had and does not want to have its men organized, though it, of course, recognizes that under the Wagner Act its men have a right to organize, the record ought to be entirely free of evidence that the management has, through officers or employees, not officers but having the confidence of the management and acting for it, lent aid and comfort of any tangible kind to the formation or conduct of an independent organization, or has discriminated in any way in its favor, as against the affiliated union as to company time and premises, or otherwise."

On a review of the evidence, the court affirms the board's order that an association of employees involved be disestablished.

Union Activities

New York State Labor Relations Board, et al. v. Frank G. Shattuck Company (Chain Service Restaurant Employees Union, Local 42, Intervenor), decided by the New York Supreme Court, Appellate Division, First Department, June 28, 1940; reported at 20 N. Y. S. (2d) 949.

An order of the New York State Labor Relations Board required the appellant company to cease and desist from interfering with its employees' joining labor unions, from discriminating against employees who associated themselves with such unions, and from keeping under surveillance the union activities of its employees. Various actions of the employer are found by the court to constitute such interference, and that part of the order is to be enforced.

The order also directed the company to reinstate four employees with back pay, upon the ground that they had been discharged or refused employment because of labor activities. That part of the order is found not to be supported by the evidence, and the court accordingly refuses a decree for its enforcement.

Written Agreement

Fort Wayne Corrugated Paper Company, v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, March 28, 1940, rehearing denied May 20, 1940; reported at 111 Fed. (2d) 869.

In this decision the court affirms an earlier decision, for the Seventh Circuit, that the National Labor Relations Act does not obligate the employer to enter into a written contract. In this instance, however, the action of the employer in posting "memoranda" of labor and wage terms, neglecting to state that they were the culmination of negotiations with the union, is held to evidence hostility to the union and refusal to recognize it. The order requiring collective bargaining and a written agreement upon request, of the terms agreed upon will be enforced.

Another issue in this case was whether the company engaged in an unfair labor practice in telling an employee he must desist from outside labor-union activities or be laid off. As a union official, this employee represented employees of another company in their collective-bargaining efforts with their employer, who was a customer of the company here concerned, and who withdrew his business because of such activities. The court, while "inclined to question the judgment, the wisdom, and the common sense of a union member employee who carries his union activities to the partisan and offensive extreme of causing his employer's customer to cancel its orders," holds that the act "will not be construed to have so narrow a scope as to protect union activities only in the interrelation between the employees and employer of one company."

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Portable Conveyors—Revolving Screens

Lock-Out

National Labor Relations Board v. Somerset Shoe Company, decided by the U. S. Circuit Court of Appeals, First Circuit, May 9, 1940; reported at 111 Fed. (2d) 681.

After some labor unrest among the respondent company's employees, then unorganized, the workers formed an unaffiliated union. The company thereafter made individual wage adjustments, but the workers were not satisfied with the way the management carried out the agreement, and called in organizers from the C. I. O. The C. I. O. obtained the signatures of a majority of the company's employees, and requested a conference to discuss a union agreement. The company meanwhile curtailed production and finally closed the plants; it was stated in a newspaper, as the company's policy, that the plants would remain closed until "local shoe workers agree to abandon outside affiliations." The employees declared themselves on strike, but through the efforts of a "citizens' committee" (during which the employees were given secret ballots for expression on the question of local or affiliated union) the plants were reopened. Thereafter application blanks for membership in a new independent union were circulated in the plant, and the company recognized the new union as the employees' bargaining agent.

The National Labor Relations Board found, and the court agrees, that the C. I. O. union was the duly designated representative of the production employees concerned; and that the company had failed and refused to bargain collectively with the chosen representative of its employees, in violation of the National Labor Relations Act. The fact that the plant was shut down, says the court, did not absolve the company from the obligation to bargain with the representative of its employees; nor was the company excused by a claimed lack of proof that the union represented a majority of the employees. A lay-off as such is not necessarily an unfair labor practice, but the decision to close down production, in this case, "was actuated by a purpose to interfere with the self-organization of its employees" and hence violated the act.

The part of the board's order requiring reinstatement of the employees with back pay is approved in general but is remanded to the board for specific findings on some questions of fact. The portion requiring the company, upon request, to bargain collectively with the C. I. O. union (until the employees make another determination of bargaining agent of their free choice), and the cease-and-desist portions of the order will be enforced.

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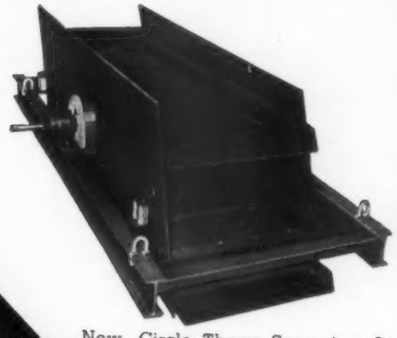

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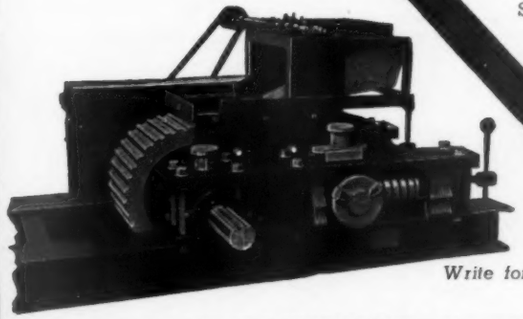
New, Circle Throw Screening Action insures a *better* deal in grading—sets the high marks in capacity, uniformity of product and thrifty operation. Heavy Duty Screen built in six sizes, one to three decks.



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Self-Organization

National Labor Relations Board v. Sterling Electric Motors, Inc., decided by the U. S. Circuit Court of Appeals, May 7, 1940; reported at 112 Fed. (2d) 63.

This decision affirms an earlier decision by the same court in the same case (109 Fed. (2d) 194) that the National Labor Relations Board has no right to compel the disestablishment of a self-organized inside or company union in a proceeding wherein such union was not a party, had no notice, and had no opportunity to be heard. The protection of the National Labor Relations Act, says the court, "extends as much to the self-organized unions, provided for in Section 1 of the act, as to the powerful unions already existing and seeking to increase their membership."

The court "can not believe that the Supreme Court in the *Licorice* opinion (*National Licorice Company v. National Labor Relations Board*, 60 *S. Ct.* 569), holds that Congress, while intending such 'protecting' made it mere mockery by conferring on the board the power to destroy by disestablishment a union, so self-organized, or to frustrate it in the performance of the very functions which the act requires the board to protect, without making it a party or giving it an opportunity to be heard."

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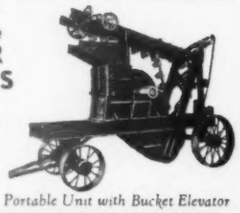

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TRAFFIC NEWS DIGEST

Interstate Commerce Commission

Rates on Sand and Gravel.—Relief from the long-and-short-hand part of the fourth section in establishing rates on sand and gravel and related commodities from points in Illinois, Indiana, and Wisconsin to destinations in the Chicago, Illinois-Gary, Indiana, district, from Cayuga and Dickason, Indiana, to Chicago Heights, Illinois, and from origins in Wisconsin to Evanston and Arlington Heights, Illinois, has been granted by the commission, division 2, in fourth-section order No. 13865 in fourth-section application No. 18015, sand and gravel—Chicago, Illinois,—Gary, Indiana, district, embracing fourth-section applications Nos. 17453, as amended, 17930, and 18270.

The commission has authorized applicants in No. 18015, as amended, to establish and maintain over their existing interstate lines or routes, on sand, gravel, crushed stone and slag carloads, from points of origin in zones 1, 2, and 3 in Illinois, Indiana, and Wisconsin to destinations in the Chicago, Illinois-Gary, Indiana, district, rates constructed on the bases approved in the report on further hearing in Chicago Gravel Company *v.* Atchison, Topeka & Santa Fe, 234 I.C.C. 664, and on like traffic from Cayuga and Dickason, Indiana to Chicago Heights, Illinois, rates not lower than 65 to 85 cents a net ton, for single-line and connecting-line movements respectively. Applicants in Nos. 17453, 17930, both as amended, and 18270, have been authorized to establish and maintain on sand and gravel, carloads, over their routes from Afton and Janesville, Wisconsin, and on crushed stone, carloads, from Ives, Wisconsin to Evanston, Illinois, a rate not less than 55 cents a net ton, and on sand and gravel from Afton and Janesville to Arlington Heights, Illinois, a rate not less than 52 cents a net ton. In the latter three applications, the applicants have been given authority to maintain higher rates to intermediate points, except intermediate points in the Chicago-Gary district. The relief given in all the applications is subject to a 70-per cent. circuity limitation and the relief was generally sought to meet truck and water competition.

Marble and Granite Rates.—In No. 2828, Barre Forwarding Company, *et al v.* Montpelier and Wells River *et al*, heard by Examiner Carl A. Schlager, dismissal was proposed. On shipments of marble or granite blocks from points in New England to destinations in Illinois, Indiana, Michigan, Minnesota, Missouri, and Wisconsin, the rates charged were proposed to be found to have been applicable. The shipments, according to the reports, consisted of blocks or pieces of granite or marble, all falling within one of the three groups designated as "rough" "dressed" or "carved." Complainants claimed that the rates charged were unreasonable and presented claims for overcharges. It was said that the rates charged were on the basis prescribed for application within official territory in Consolidated Stone Cases, 200 I.C.C. 65 and on the three commodity groups mentioned had been and were 22.5, 27.5, and 35 per cent., respectively, of the first-class rates.

The claims of the complainants were based on the contention that there were in effect, when the shipments moved, commodity rates which took precedence over the class or column rates charged. The question presented was one of tariff interpretation.

Association of American Railroads.—At a recent meeting of the board of directors of the association of railroad presidents who attended, were optimistic as to the ability of the railroads to meet the traffic demands that might develop. However, they were not so happy about the actual demand for their services now in sight. The car supply situation was discussed at the meeting and individual executives reported as to

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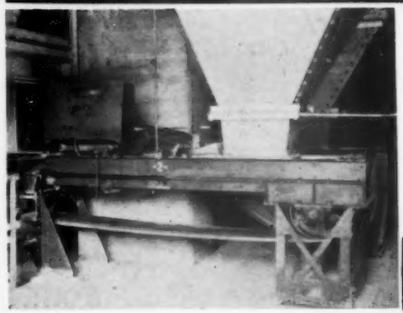

Feedoweight combines in a single unit a conveyor type feeder and scale.
It automatically feeds the material by weight and accurately totals and registers the amounts.
Precision is assured by power-operated feed and control gate.
Feeds two or more materials in correct proportions by batch or continuous method.
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loading. Those from the west and the south particularly expressed a desire for more traffic.

The Car Service Division of the A.A.R. announced in July that the use of open-top cars would be restricted to the "purpose for which they are designed, that is, the movement of freight." According to this order, which was effective July 15, no coal cars will be placed for loading at coal mines where more than one day's supply already is being held under load and unconsigned. Such cars are commonly known in the trade as "no-bill" coal cars.

NEW MACHINERY AND SUPPLIES

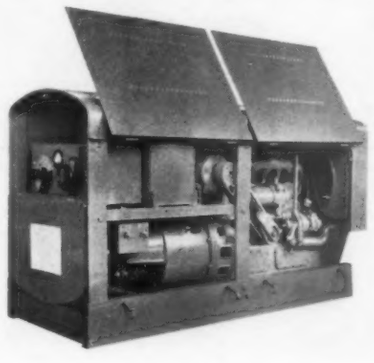
• Roll-Crushers

The Iowa Manufacturing Company of Cedar Rapids, Iowa, has redesigned its entire line of roll-crushers, incorporating several new mechanical and structural features.

In the new crushers, roll shells are mounted on tapered cores by means of three sectional wedges. The shell is tapered to correspond so that when bolts are tightened the tension is exactly the same all around the shell and it is held firmly without slipping.

Smoother operation, longer wear and lower power consumption are advanced by the use of pinion and gear drives from countershaft to stationary shaft and by use of finger timing gears for transmission of power from the stationary to the floating roll. Both the gear and pinion and the finger gears are completely enclosed and run in oil.

Adjustment of the opening between rolls can be made very simply and quickly by removing or inserting shims in a slot on top of the frame. These adjustments can be made while the roll is operating. Heavy helical chrome vanadium steel wire springs keep the



The application of gasoline-engine starting on Diesel-driven arc-welders, announced previously on a 300-ampere unit by The Lincoln Electric Company, Cleveland, has been further extended and is now available on the 400-ampere model illustrated. This advance makes available easy starting in any weather and the inherent economies of Diesel drive in the many applications for engine-driven welders of capacities up to 400 amperes. Fuel-oil consumption is 1.5 gallons per hour at full-load operation compared with 2.75 gallons of gasoline with conventional engine-driven welders.

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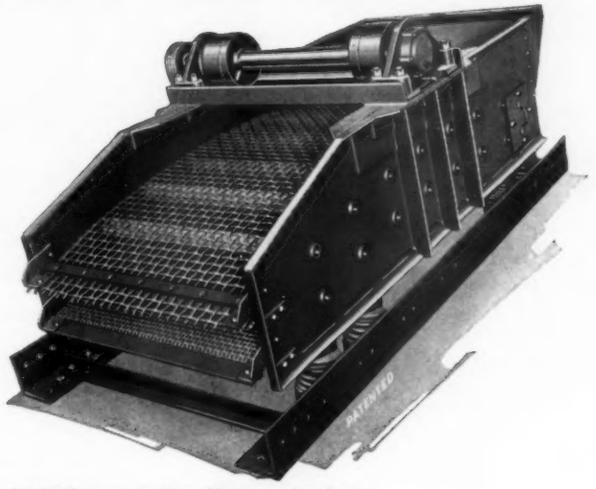

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2. Screen cloth automatically held under uniform tension.
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Canadian Licensee and Manufacturer:
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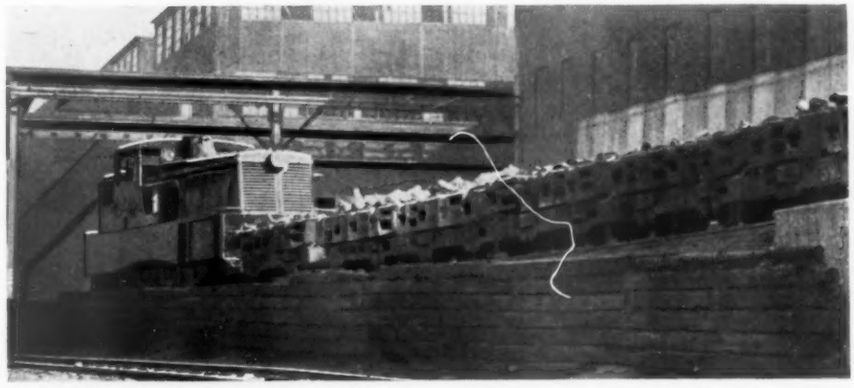


TOUGHEST DIESEL SWITCHER EVER BUILT

SIMPLE—Instantaneous finger-tip control. No complicated parts and delicate contactors to cause delays. No intricate and expensive electrical equipment to maintain.

RUGGED—Extra heavy locomotive frame, built of open hearth steel slabs ranging from 4 to 5 inches thick. Driving rods, boxings and other parts built for heavy duty service.

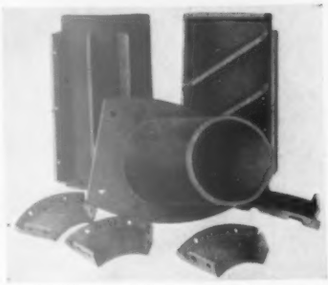
ECONOMICAL—Yet this powerful, rugged Plymouth Flexomotive has the lowest fuel consumption per horsepower—with the highest ratio of efficiency to fuel consumption—of any diesel yet built. Maintenance, too, has been proved exceptionally low.

Send for complete descriptive bulletin

PLYMOUTH LOCOMOTIVE WORKS
Division The Fate-Root-Heath Company
Plymouth, Ohio

Plymouth FLEXOMOTIVE
GIVES YOU EVERYTHING YOU WANT IN A LOCOMOTIVE!

Avoid "BURNOUTS" BY USING PYRASTEEL for high temperatures



Continuous service at 2000° F., with no costly delays for replacing burnt-out kiln parts . . . that's the advantage of using PYRASTEEL for such items as Feed Spouts, Retainer Rings, Lifter Bars and Liners, shown above. Many other economical uses of this heat and corrosion resisting alloy in your cement mill equipment. Ask for Bulletin.

Chicago Steel Foundry Company

37th Street and Kedzie Ave., Chicago, Ill.
Makers of Alloy Steel for 30 Years

SIMPLICITY

GYRATING SCREENS have made a remarkable record of real service when compared with competitive equipment under actual operating conditions.

The Ohio Marble Company operated Simplicity Screens together with others for many years, so they obtained comparable results. Based on these results, they purchased Simplicity Gyrating Screens for their new modern plant.

You too, can have capacity, efficiency and low operating costs by installing Simplicity Screens.

Simplicity
ENGINEERING COMPANY
DURAND, MICHIGAN

Small model material-moving unit features both power and speed.

proper tension on the floating roll so that the opening between rolls remains constant under proper working conditions. The springs relieve undue stress and prevent breakage if uncrushable material is accidentally introduced. If the uncrushable material should be exceptionally large, shear plates at the ends of the springs relieve the tension entirely.

All sizes are equipped with antifriction bearings. The frame is welded, riveted and cross-braced I-beam construction. Roll shells are manganese steel. The flywheel is extra semi-steel. Six sizes are built from 16 by 16 inch to 40 by 24 inches.

• Scraper Unit

Combining the speed of a truck and the power of a tractor, R. G. LeTourneau, Inc., has developed its third and smallest Tournapull, known as the Model C, for long haul dirt moving.

Powered by a Caterpillar, six cylinder D-468 Diesel engine, it has a top speed of 13 to 15 miles per hour, depending upon tire equipment. At 1800 r.p.m. it develops a maximum brake horsepower of 90.

To give the greatest possible traction per pound of weight, the entire weight of the engine and half of the weight of the Carryall scraper and its load are placed on the two large pneumatic-tired drive wheels by the elimination of front wheels. The tires spread over a large ground area under the weight of the unit and the additional weight of the load, thus increasing gripping power and traction.

Steering is accomplished by independent operation of the two drive wheels, each controlled by a slow-speed, heavy duty, double cone clutch, using a metal lining running in oil.

Mated to the Model C Tournapull is the newest Carryall scraper, the Model LS, with a struck capacity of 8.2 cubic yards and a heaped of 11. The combination is a self-loading unit. However, to get the maximum operating efficiency, reduced loading time and increased pay yards, pusher loading is recommended.

Speeds compare very favorably with those of large trucks. In addition, Tournapulls are able to negotiate adverse ground conditions that are impossible for road-bound trucks even of four-wheel design. Being a self-loading and self-spreading unit, the economies of tractor-scraper operation are extended to truck haul jobs and, as a result, longer and more difficult hauls made faster and cheaper.

• Drag-Line

The Page Engineering Company of Chicago announces the development of a new two-engine Diesel-powered walking drag-line.

The manufacturer states that this drag-line is a new development in large machines, giving such machines exceptionally fast hoist and swing at the same time. It is stated the user need no longer delay the swinging of the machine, waiting for the hoisting of the bucket.

"To understand the full possibilities of this faster operation with a Page two-engine walker, visualize using all of the power of your present drag-line for hoist only, without swinging the machine," the company suggests. "You will find that the hoisting speed will be increased greatly. Now consider a second independent engine for swinging only. This second engine accelerates the swing in proportion to the faster hoist. The two engines --the large Diesel, which only hoists and loads the bucket, and the smaller independent Diesel for swinging as rapidly as the faster hoist demands—furnish perfectly balanced power and increase the number of loaded buckets that can be handled per minute. Moreover, the Page two-engine walker is not cumbersome but much more compact and less expensive than a single-engine drag-line carrying the same total horsepower."

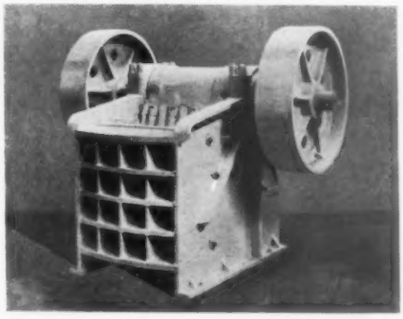
RIGHT—Two Diesel engines, one for hoisting and loading, the other for swinging only, are used on this walking drag-line to speed up operation.

• Jaw Crushers

Two new jaw crushers have just been announced by Diamond Iron Works, Inc., Minneapolis, made in sizes 20x36 and 24x36. These two models have many features embodying the latest in crusher development.

The long jaw design and contour of the breaker plates assure more positive grip and crushing effect on the upper or feed end of the jaws. The long jaws produce a more uniform product by preventing larger stone and slabs from passing before reduction.

The main frame is all welded from heavy steel plate, annealed for stress relief and accurately machined. The eccentric pitman shafts designed for heavy duty have liberal oversize dimensions. These shafts are forged from special alloy steel to rough dimensions, machined, heat treated, ground and polished to accuracy for bearing fits.



Jaws and breaker plates in this crusher are of new design.

Journal and pitman bearings are all special purpose heavy duty roller types with rating for shock loads far in excess of hard rock crushing factors.

The pitman is of heavily-ribbed steel castings, annealed and accurately machined for bearings, toggle seat and manganese jaw. Jaws, cheek plates and pitman toggle seat are of manganese-steel castings. Product size adjustments are by reversible hand lever ratchet raising or lowering the adjusting wedge against the rear toggle seat. Adjusting mechanism is enclosed for dust and dirt protection. The cast iron toggle has chilled bearing edges. This toggle is designed to break, if large pieces of tramp iron or other uncrushable materials jam the jaws, thereby protecting the expensive parts of the crusher.

Lubrication is by Alemite high pressure fittings to each individual bearing, which is sealed against dirt and abrasive grit. All bearings are equipped with flush and drain openings for cleaning old grease from bearings when advisable.

• Roller Bearing

The Timken Roller Bearing Company has recently released a modification in the design of the standard NA type, or non-adjustable, Timken roller bearing. Made up of a double row outer race or cup and two single row inner races or cones, it is especially adapted to serve as a sheave bearing.

The races and rolls are ground to established precision limits so that when the cones are assembled into the cup the front faces of the cones contact and the proper running clearance is provided. The front cone faces are slotted and chamfered as shown to provide an entrance for lubricant to within the bearings. This feature is particularly advantageous in multiple sheave blocks where it is required that the bearings be lubricated through the pin which is stationary.

The chamfered front faces eliminate the necessity of using a lock washer between the cone and the adjusting nut. The nut is tightened against the cone face and the bearing adjusted to the proper running clearance. The nut is then locked in position by a set screw.

The extra STRENGTH is in the Spiral

THE once necessary evil of using *heavier* pipe than was needed in order to obtain the required *strength,* was wiped out when Taylor Forge pioneered spiral pipe.

That spiral seam makes it possible to produce a pipe that is light walled and therefore less expensive to buy, ship, and use—yet strong in every way, thanks to the spiral reinforcement which stiffens it from end to end—holds it round and true against collapsing strains—gives it bursting strength even beyond that of a seamless tube of equal gauge.

You simply choose the gauge you need for the job, never paying a penalty for superfluous weight. Let it cut the cost of water, sand and gravel lines. Ask for the new Catalog 36.

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It will pay you to check up on the new thrifty all-welded steel, space saving, legal load Universal Portable Gravel and Quarry Plants.

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The new Pacemaker Quarry Plant

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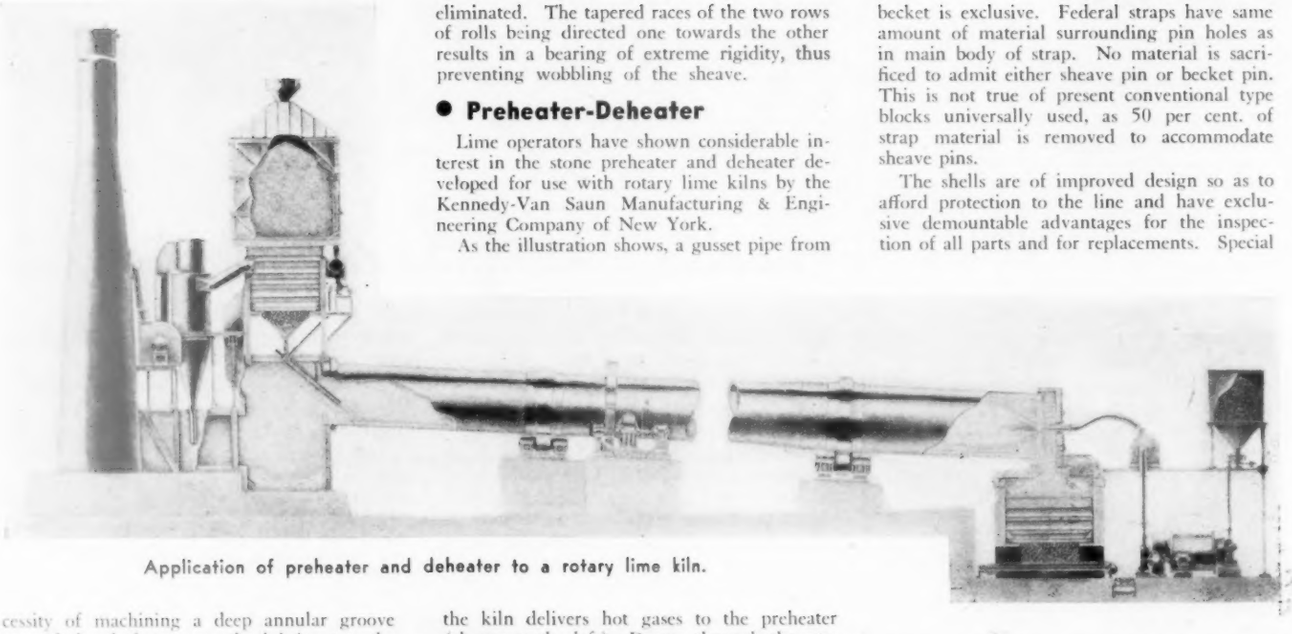
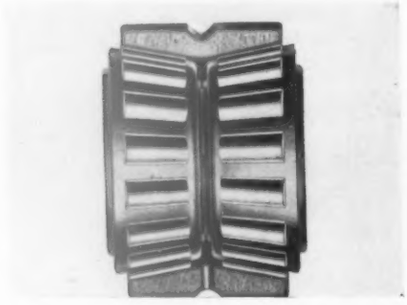


Application of preheater and deheater to a rotary lime kiln.

cessity of machining a deep annular groove around the shaft to carry the lubricant to the various points of entrance in the bearing. In some sheave blocks, lubricant may be introduced through a fitting in the sheave hub, and for this design an annular groove and holes are provided in the cup.

The problem of sealing the bearing chamber has been greatly simplified by extending



Cut-away view of the new roller bearing.

the length of the large cone rib and creating a surface concentric with the shaft and sheave bore on which a seal may be run.

Being an anti-friction thrust bearing as well as an anti-friction radial bearing, the sheaves may rotate freely without axial float. Wear between sheaves and side plates is positively eliminated. The tapered races of the two rows of rolls being directed one towards the other results in a bearing of extreme rigidity, thus preventing wobbling of the sheave.

• Preheater-Deheater

Lime operators have shown considerable interest in the stone preheater and deheater developed for use with rotary lime kilns by the Kennedy-Van Saun Manufacturing & Engineering Company of New York.

As the illustration shows, a gusset pipe from the kiln delivers hot gases to the preheater (shown at the left). Drawn through the preheater by a fan, the dust-laden, heated air is extruded through a cyclone from which the waste gases go into the stack while the recovered dust is reclaimed and stored. After the preheated stone is calcined by passing through the kiln, it is discharged to the deheater (right). For two or three hours, the lime is "soaked" and gradually cooled as air is drawn upward through the mass. At the right of the preheater is the air-swept tube-mill and coal bin for firing the kiln.

The company claims this system cuts fuel consumption and allows the efficient use of shorter kilns, meanwhile making the production of a uniformly-burned product.

The Kennedy system of heat recovery is controlled by selective automatic controls from a switchboard at the firing end of the kiln so that it is at all times in the hands of the operator to control the amount of coal delivered to the kiln, to regulate the flame length, and to control the point at which the calcination process is completed.

• Blocks

The Federal Alloy Block Company, Cincinnati, announces a number of important improvements in its line of blocks for manila and wire-rope service which contribute to greater safety, lifting capacity, efficiency and low-maintenance cost.

Federal enlarged safety straps and extra large diameter pin construction at sheave and becket is exclusive. Federal straps have same amount of material surrounding pin holes as in main body of strap. No material is sacrificed to admit either sheave pin or becket pin. This is not true of present conventional type blocks universally used, as 50 per cent. of strap material is removed to accommodate sheave pins.

The shells are of improved design so as to afford protection to the line and have exclusive demountable advantages for the inspection of all parts and for replacements. Special durable aluminum-alloy shells are available for manila rope. Malleable iron and cast steel shells are also made for manila or wire rope. An essential element in the aluminum alloy smoothes the surface of the rope, instead of fraying it, thus preserving its strength and

Improved types of safety blocks.

prolonging its life. Its adoption will reduce cordage bills and accident hazards.

Rivets are eliminated in Federal blocks, which have fewer parts, and are secured by heavy steel "zipper" sleeves which grip shell lugs and members securely. The cost of replacement parts is said to be nominal.

• Pump Bearing

By heavy application of chromium over a monel stainless sleeve which has been swedged into a vertical pump shaft, a new type of water-lubricated bearing has been produced by Peerless Pump Company of Los Angeles. The process has been perfected for use in deep well vertical pumps. The pump shaft is armored with heavy chromium over a non-corrosive metal sleeve every 10 feet. These sections of the shaft operate within resilient cutless rubber journals, which are fluted and are non-revolvable. Any sand in the water flushes through the bearing. Because of the extreme hardness and thickness of the chrome, and its bearing contact with cutless rubber, no abrasion occurs, according to Peerless engineers. Heretofore the use of a chrome surface was not satisfactory, due to its microscopic poros-

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Any size or style screen, in thickness of steel wanted with any size perforation desired.
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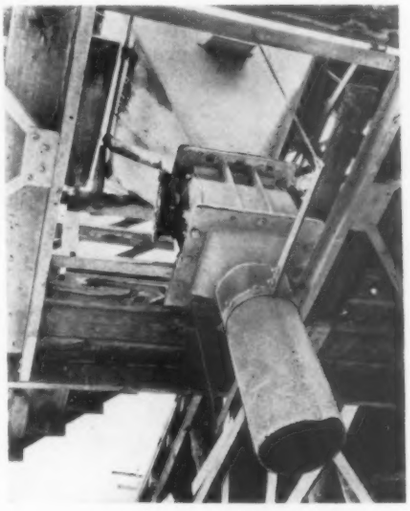
ity, its thin wall and its eventual disruption from the carbon steel to which it was usually bonded. By the new Peerless process the chromium is deposited by electrolysis to monel to a thickness of approximately .003 inch, which is more than 50 times as thick as ordinary automotive chromium plating and several times the thickness of chrome heretofore applied. In pumps placed under accelerated life tests, pumping water heavily laden with sand, the results indicate a shaft life of 27 times that of an ordinary carbon steel shaft.

• Telescopic Chute

The Blaw-Knox Company has developed a new telscopic chute for use on bulk-cement weighing batchers to accommodate various sizes and heights of batch trucks and truck mixers. A number of these have been furnished for use on the Pennsylvania Turnpike and other projects where batching plants are called upon to serve a wide variety of trucks.

Batching operations are facilitated because the chute compensates for varying heights



Telescopic chute to accommodate trucks of varying heights.

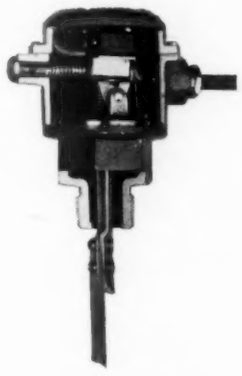
with a minimum loss of time. Ease of adjustment is assured by a counterweighted construction. The amount of vertical adjustment ranges between 31 and 50 inches. This provision to accommodate differences in height enables complete elimination of cement spillage during discharge.

The new chute illustrated in the accompanying photo can be furnished for standard manual cement batchers, or for the shrouded type of batcher required in some states. It can be installed satisfactorily on any Blaw-Knox cement batcher of the rotary-discharge-valve type.

• Flow Switch

The McDonnell No. E-1 flow switch is a piece of equipment which may have numerous uses about the pit, quarry and plant.

The switch, which is tapped into any pipe line, is simple in operation. The flow of material through the pipe strikes and moves the switch paddle causing an electrical circuit in the switch to be completed and allows current



Cut-away view of switch and actuating paddle.

to actuate the pump, an alarm, etc. The circuit, of course, remains completed until the flow stops and the pressure on the paddle is released. Reverse-acting switches are also available which break the circuit when the flow starts and complete it when the flow stops.

The switch is rugged, very sensitive and is completely waterproof. The paddle is extremely flexible and wear-resistant and will readily allow the passage of solid objects, such as large stones in a dredge line. No interference with the rate of flow is experienced, according to the maker, McDonnell & Miller, Chicago.

• Screen Cloth

Screen cloth, with the strands wedge-shaped in cross section and the flat working surface exposed to wear, is being marketed by the Wedge Wire Corporation of Cleveland.

The screen is supplied in a wide variety of metals with standard apertures from .01 inch and upward. Advantages claimed are the large, effective screening area provided, prevention of blinding since the apertures enlarge downward due to the wedge-shaped wires, and long life without mesh distortion.

The new 2-kiln lime plant being built by the Marble Cliff Quarries Company at Lewisburg, Ohio. Rebuilt crushed-stone plant is at the right.

Laughlin drop forged Safety Clips treat wire rope right. No bending — crimping — or fraying the strands. After removing Laughlin Safety Clips, the rope is straight, unbowed, ready for use again — saving wire rope.

Use Laughlin Safety Clips and avoid rope-crimping with U-Bolt Clips.

FEWER CLIPS NEEDED. Laughlin Safety Clips are so efficient that three of them give you the same strength as four ordinary U-Bolt Clips.

Use Laughlin Safety Clips and save money.

THIS TEST DESCRIBED IN NEW BOOKLET. Tests made by a famous engineering school prove conclusively that Laughlin Safety Clips delivered better than 95% of rope efficiency.

Write for the free booklet that describes these tests — and also the other money and time-saving advantages you get with the modern "fist-grip" clip. Use the coupon below

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Portland, Maine

Please send me free Safety Clip booklet P-8

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Check here for catalog on items below ☐

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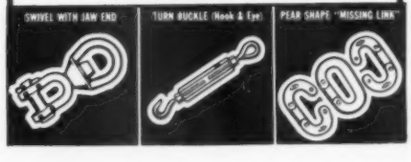

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The Leahy HEAVY DUTY VIBRATING SCREEN

Smart PRODUCERS

are quick to take advantage of any economies assured by the use of more modern equipment, as shown by the increasing demand for the Type "C" LEAHY No-Blind Vibrating Screen with TRI-VIBE. This feature gives triple-powered vibration over the entire free-swinging screen jacket, resulting in extra capacity, greater uniformity and lower costs on Fine Mesh Screening.

Be smart, and get the facts about this screen. Ask for Bulletin No. 14.

The Deister Concentrator Company
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Trade Literature

Farval Dualine Jr. Centralized System of Lubrication. (4 pages) Farvel Corporation, Cleveland.

Copes Flowmatic Regulator. (16 pages) Northern Equipment Company, Erie, Pennsylvania.

The Last Word in Automatic Control for Synchronous Motors. (8 pages) Electric Machinery Manufacturing Company, Minneapolis.

Air-Maze Air Filter Panels. (20 pages) Air-Maze Corporation, Cleveland.

Goodall Mechanical Rubber Catalog. (68 pages) Goodall Rubber Company, Inc., Philadelphia.

Thermix Dust Collectors. (12 pages) Pratt-Daniel Corporation, Port Chester, New York.

Marmon-Herrington All-Wheel Drive for Heavy-Duty Service. (8 pages) Marmon-Herrington Company, Indianapolis.

Panel Instruments. (8 pages) Roller-Smith Company, Bethlehem, Pennsylvania.

A Dependable Mechanical Bucket Loader. (4 pages) Jeffrey Manufacturing Company, Columbus, Ohio.

Thermocouples—Assemblies, Parts, Accessories. (38 pages) Leeds & Northrup Company, Philadelphia.

Aerocrete — Lightweight Concrete. (12 pages) Aerocrete Corporation of America, New York.

Cromatile—A New Concrete Unit. (12 pages) Cromatile Associates, Inc., Grand Rapids, Michigan.

A REVIEW OF RECENT BOOKS

COMMODITIES IN INDUSTRY, *the 1940 Commodity Year Book ($7.50), 720 pages, 200 illustrations. Published by Commodity Research Bureau, 82 Beaver Street, New York City.*

That a commodity price boom in the United States will be the inevitable result of the current war in Europe is the conclusion of the editors of this volume. Original research studies contained in the new book indicate that every long war has been accompanied by a great advance in the general price level. From present indications, the current war in Europe will have a similar influence on world prices, with the violence of the boom to be determined by the ultimate length of the war, according to the editors.

In addition to its discussion of the general commodity price level, the editors analyze 75 basic commodities individually. These studies are supported by more than 150 charts and 625 statistical tables. They find many striking similarities between price movements during the present war and the early stages of the first World War which started in 1914.

In its individual analysis of the 75 major commodities, the editors have included step-by-step descriptions of how each of these commodities are converted into finished products through new methods. The editors credit more than 150 outstanding corporations who coöperated by providing source material and making valuable suggestions. It is believed that this is the first time that this type of information has been presented in one volume.

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12 Sizes
⅜ to 1¼ Yard
Also truck mounted shovels and cranes

Reducing Handling Costs . . .

At the Eden Gravel Plant, this Model 20 gets around rapidly on fast moving crawlers—first on excavation of hard packed gravel, then at loading from stock piles. With its 10 tons of weight, this husky little ⅜-yard convertible shovel is an economical gravel digger. Want details? Ask for Catalog H-3.

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INCORPORATIONS

COLONIAL CONCRETE PRODUCTS CORPORATION, Norfolk, Virginia. $50,000. Clair E. Crawford, 115 College Place, Norfolk.

SPRINGFIELD SAND & GRAVEL COMPANY, Springfield, Oregon. $40,000. W. H. Jewitt, Lewis Johnson, Wilson Jewitt.

REDI MIX CONCRETE COMPANY, Miami Beach, Florida. 50 shares n.p.v. Louis Heiman, David Hendrick, Edythe Frelich.

A. B. SMITH CONCRETE COMPANY, Branchville, Maryland. 500 shares $100. A. H. Smith, David J. Breerwood, Allen Thrift.

VACUUM CONCRETE COMPANY OF OHIO, Cincinnati. $25,000. Milton H. Schmidt, Harry Kasfir, Donald A. Fisher.

CONCRETE MIX, INC., Muncie, Indiana. 250 shares $100. F. E. Schouweiler, George L. Kempf, and R. F. Miser.

FLORIDA CONCRETE PIPE COMPANY, Jacksonville. 300 shares $100. C. A. Wallace, D. K. Hiller, George E. Turner.

MINERAL RIDGE FLUORSPAR COMPANY, Livingston County, Kentucky. $100,000. C. C. Grassham, Fred S. Lack, G. Dickey, E. Palmer James.

ANDERSON QUALITY BLOCK COMPANY, Anderson, Indiana. 1,000 shares $10. John E. Edwards, Joseph W. Campbell, Robert B. Campbell.

P. A. KIRK CONCRETE MIXING COMPANY, Owensboro, Kentucky. $21,000. Paul A. Richard, B. and Florence V. Kirk.

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Patented

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more than 100 sold in the last 2 years!

There are no "ifs" and "ands" about Joltcrete. The famous Wisconsin tests, the steadily mounting sales of these machines and their impressive performance records in the field simply add to the mass of evidence that Joltcrete has *arrived*—in a big way.

Joltcrete is made in three sizes with capacities *second to none.* No other process makes blocks so clean cut, true-to-size, uniform in texture. Joltcrete blocks are *dense*—high strength—low absorption. No core bar marks or planes of weakness. Joltcrete assures more blocks per bag of cement.

The Joltcrete pioneered process of making blocks by *vibration under pressure* is fully covered by patents and patents pending. There's nothing to worry about there.

And remember: Only *Stearns* makes Joltcrete!

STEARNS
MANUFACTURING CO. - ADRIAN, MICH.
GENE OLSEN, PRESIDENT

Write for Joltcrete literature today. Study it—ask questions. *You'll be convinced!*

Stearns of Adrian is headquarters for Joltcrete, Tamp Type Machines, Skip Loaders, Mixers and a complete line of modern concrete products plant equipment. Ask for folders covering the items that interest you.

The CONCRETE MANUFACTURER

September, 1940

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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Fire Causes Huge Loss

Fire caused more than $150,000 damage on the afternoon of August 3 at the plant of the Shearman Concrete Pipe Company at Knoxville, Tennessee.

A number of new concrete-pipe machines which were awaiting delivery were lost in the fire. The company, in addition to producing concrete pipe, also makes machinery for sale. According to Thomas Shearman, head of the concern, plans for rebuilding are nearing completion.

Cinder-Block Men Meet

Clinics on merchandising and on manufacturing occupied the major portion of the three-day convention of the National Cinder Concrete Products Association convention held August 5, 6 and 7 at the Hotel Traymore at Atlantic City.

The manufacturing clinic was conducted by H. A. Davis of Washington, D. C., chairman of the association's research committee. Participating were Ray McCandless, Detroit, and C. B. Fellabaum of Toledo who discussed the preparation of aggregate, while Charles P. Lower, Bethayres, Pennsylvania, and S. Paturzo of Baltimore talked upon the gradation of aggregate. Mix control was covered by A. L. Bowling, Roanoke; George Krier, Brooklyn; and Walter Manhardt, Milwaukee. The broad subject of curing was ably discussed by W. G. Kaiser of the Portland Cement Association and E. M. Campbell, Pittsburgh.

Clifford C. James, professor of marketing of the University of Baltimore, conducted the merchandising clinic. Participants included: Herbert Vincent, Detroit; Charles W. Akers, Nashville; E. M. Johnson, Cincinnati; George W. Goelitzer, Kansas City; F. J. Straub, New Kensington, Pennsylvania; Fred W. Reinhold, Buffalo, and Roy C. Willig, Westfield, New Jersey. These speakers analyzed the important selling points to be stressed in bringing cinder block to the attention of the architect, the engineer, the contractor, and the builder. Promotion of the material by the erection of cinder-block demonstration houses was urged generally as an important means of winning public acceptance.

Other speakers discussed the use of the cinder units in floor construction, the prevention of cracks in walls, developing water-tightness, and the need for research in the industry.

George W. Goelitzer of Kansas City was elected president for the coming year as the convention closed.

Nelson Branches Out

A. P. Nelson, head of the Spencer Cement Block Works at Spencer, Iowa, and one of the country's best known concrete-products manufacturers has completed the construction of a plant at Spencer for the manufacture of super wind-chargers.

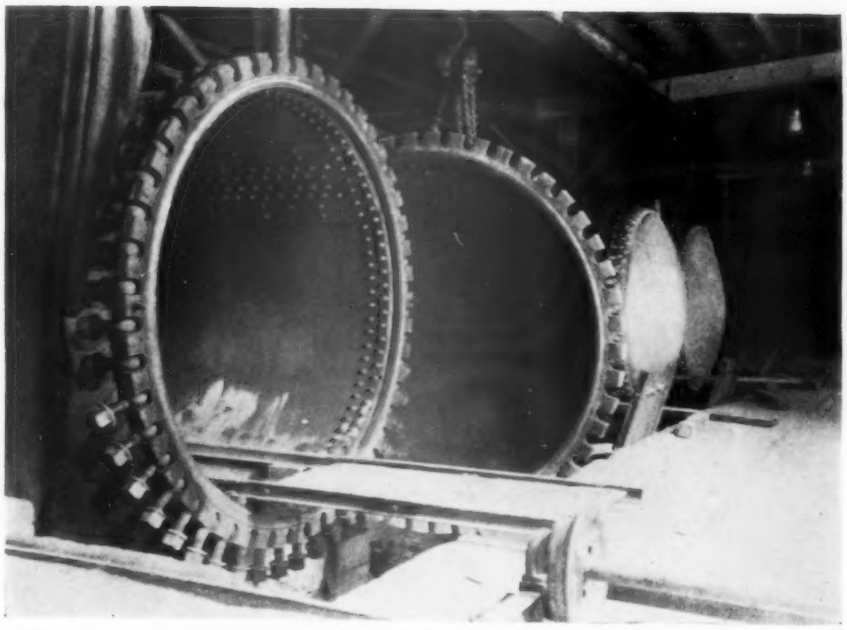
The device, which utilizes the wind to generate power, has been developed by Mr. Spencer in recent years and has enjoyed a phenomenal sale in this country and foreign lands.

The new wind-charger plant is a one-story, concrete-block structure with over 7,000 square feet of floor space. Capacity of the plant is 15 units per day. More than 20 men are employed.

Five 3½-cubic yard Jaeger truck mixers recently purchased by the city of Minneapolis.

By HARRY F. UTLEY

Ann Arbor Operator Builds Plant to Utilize High-Pressure-Steam Curing



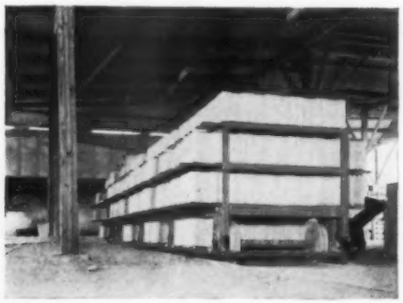
Looking along the ends of the four steel curing cylinders.

LUTHER G. RANDOLPH had been producing concrete units at Ann Arbor, Michigan, for 16 years when he decided a year or so ago to increase his production facilities. Located near the downtown section, his property was confined to a relatively small area bounded by a railroad and two streets. The choice lay between moving to a larger site some miles away to care for much larger curing and storage space, or installing equipment that would increase production and accelerate curing and deliveries at the original location. Mr. Randolph chose the latter method, remained where he was, and built the first plant erected *exclusively* for the production of high-pressure-steam cured concrete block. A dozen or so other manufacturers over the country had previously cured concrete blocks by this method but each had formerly used the equipment for making sand-lime bricks.

The rebuilt Randolph plant is compact and its lay-out reflects careful planning. The last tamping machine has been discarded and all production is now done by limited-amplitude vibration on three modern machines capable of turning out a total of 1,320 standard units per hour. Both gravel and cinder units are manufactured, the gravel being purchased from local aggregates producers and the cinders from the University of Michigan power-plant in Ann Arbor. Dump trucks discharge these materials into a pit, a bucket-elevator carrying them to a 60-cubic yard four-compartment overhead bin.

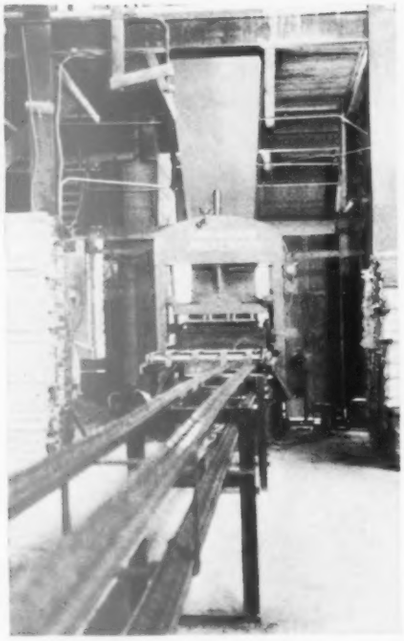
Three mixers, two 28-cubic foot Stearns and a 14-cubic foot Ideal, serve two No. 9 Stearns Joltcrete machines and a smaller Joltcrete installed this summer. Freshly-made units are carried away on a Link-Belt chain-conveyor 72 feet long between centers. Paralleling this conveyor is a narrow-gage track accommodating the Chase rack cars which are loaded by workmen from the conveyor. Each car has a normal capacity of 100 standard 8-inch units arranged, as one of the illustrations shows, to utilize the curing space

The plant seen from the aggregate-storage and mixing-floor end.



The rack cars are loaded to utilize the cylindrical space in the curing cylinders most efficiently.

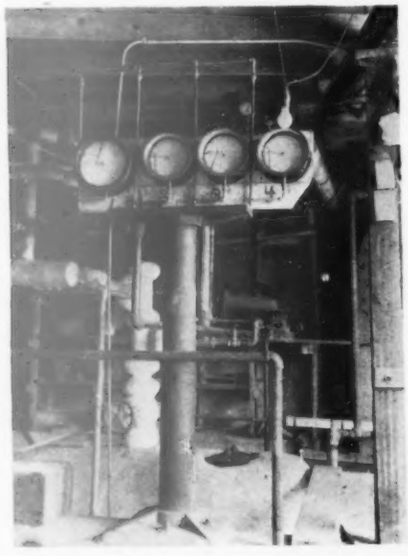
The covered storage yard. Note its neat appearance.



One of the three vibration machines. Chain-conveyor in foreground.

in the steam cylinders most efficiently.

The four Jackson & Church cylinders in the adjoining curing room range from 56 to 70 feet in length and from 6 to 6½ feet in diameter. As soon as a cylinder is filled with green blocks, the door is bolted and the steam turned on. The steam pressure reaches about 125 pounds per square inch, and after



Four gages which record steam pressures in the four curing cylinders.

approximately 8 hours the blocks are ready to be removed, completely cured and ready for delivery. Usually about twice that time is allowed for curing, however, including the time the pressure builds up and a final 3 or 4 hours in which the steam pressure and temperature gradually recede. Their average strength is high—in the neighborhood of 1,500 pounds per square inch—the units are free from future volume change, and present an unusually fine appearance.

Small amounts of finely-ground silica are added to the concrete mixtures. The silica combines with the calcium hydroxide released when the cement hydrates and, under the action of the live steam in the curing cylinders, forms calcium silicate which greatly increases the bonding strength of the cement above that occurring under ordinary curing conditions. Thus, high-strength units are obtained using a minimum amount of cement.

Although Ann Arbor is less than 40 miles from Detroit, where block prices have been hammered down as low as 7 cents, Mr. Randolph has no trouble in disposing of his output at about twice that figure. His customers, of course, know that he makes a top-quality product and reputable architects and engineers have gone a long way to help him sell his units by insisting in their construction specifications that Randolph-made units be used.

Since the blocks can be molded, cured and shipped within a day, no large storage yard is now necessary. Units that are placed in storage, however, are well protected from the elements, the 8,000 square feet of yard area being completely roofed.

Seven motor-trucks are used for making deliveries and bringing in aggregates. Included in the fleet are four Internationals, a Dodge, a Chevrolet and a Reo.

Two Truck-Mixer Makers Announce New Models

A complete new line of Rex Moto-mixers and Moto-agitators is presented to the concrete industries by the Chain Belt Company of Milwaukee. Designed specifically to make the most of the increased carrying capacity of modern high-speed trucks, these new mixers promote faster loading, faster and better mixing and have the added advantage of greater carrying capacity.

The dimensions of the new Rex Moto-mixer drum, with shorter overall lengths and larger drum diameters, mean faster loading, faster and better mixing. Added to this, their shorter overall length means that the Moto-mixer as a unit will be able to negotiate city streets or unimproved roads faster and easier.

Not the least of the new features of the new Rex Moto-mixer is the new discharge door which is definitely leak-proof, maintaining true alignment with the drum at all times. It is operated from the mixer or from the ground by a non-creeping hand-wheel.

Eliminating the need for stopping the drum to change gears, the new Moto-mixers offer twin-clutch transmission wherein on lever controls all speeds from high to low and in-between. Optional, at slighter higher cost, are pneumatic controls which give the driver finger-touch control of drive speeds from his seat in the cab. This is vitally important to the owner of Moto-mixers with truck-engine drives.

The new sizes are the 2-yard Moto-mixer with a capacity of 104 cubic feet; the 2½-yard with a capacity of 156 cubic feet; the 4-yard with a capacity of 208 cubic feet; the 5-yard Moto-mixer with a capacity of 250 cubic feet; and the "Metropolitan Special" with a capacity of 270 cubic feet.

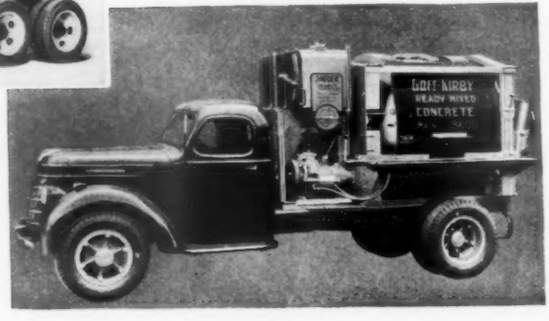
The new truck-mixer drum sizes just announced by the Jaeger Machine Company, Columbus, Ohio, for its 1941 line of truck-mixers increase the payload to the maximum that the trucks themselves should carry—loading through the top in one quick drop. That allows for ample void space, too, which is so necessary for producing highest strength concrete. This more-than-adequate void space combined with Jaeger's patented end-to-end "dual mix" action assures fast, thorough mixing, highest quality, more salable concrete.

These new 1941 Jaegers provide increased pay-load capacity, yet they are reported to sell at practically the same price as previous models. Here are the new standard capacities compared with previous models:

2 cubic yard size replaces 1½
3 cubic yard size replaces 2½
4 cubic yard size replaces 3½
5 cubic yard size replaces 4
5½ cubic yard size unchanged

The compactness of the mixers is such that the 2-cubic yard size with 104-cubic foot drum is easily mounted on short wheelbase, Ford type trucks. Other features: vacuum-controlled truck-engine drive operated from the cab with a mere flip of a finger (separate engine drive if desired); shock-proof two-speed transmissions; new Jaeger "uni-valve"—one accessible water control panel for mix, tempering and flush valves; patented Sypho-meter water tank.

Twin-clutch control is a feature of the truck-mixer shown above.



Pay-load has been increased in the new model shown at right.

By W. E. TRAUFFER

Pinopolis-Dam Concrete Proportioned, Recorded by Automatic Robot Control

General view of the concrete-mixing plant with aggregate storage in background.

IN the August issue of PIT AND QUARRY an article was published describing the production of aggregates for the Santee-Cooper Power and Navigation Project under construction near Charleston, South Carolina. This project, described in more detail in that article, is designed to provide power and water transportation for this area. Essentially it consists of two reservoirs, the Pinopolis and the Santee. The former will require a 2-mile earthen dam and a lock and powerhouse. These structures will require a total of 196,000 cubic yards of concrete and they are being built by the Central Engineering Company of Davenport, Iowa. Construction of Pinopolis Dam is now well under way, delivery of aggregates having been begun November 15, 1939.

Concrete for the Pinopolis dam, lock and powerhouse is supplied from a Blaw-Knox automatic central-mixing plant operated by the contractor. Like most plants on large projects it includes all the latest refinements in operation and control and something new. The plant has a capacity of about 80 cubic yards per hour and peak demand is expected to be about 800 cubic yards in eight hours.

The previous article described the aggregates used and their production. Three sizes of coarse aggregates used are: ¼- to ¾-inch; ¾- to 1½-inch; 1½- to 2½-inch. Some 2½- to 6-inch cobbles are also used. Sand comes from two deposits, one coarse and the other fine. All of these sizes of materials are stored and handled separately up to the actual mixing point to eliminate any possibility of segregation.

Gravel stock-piles with mixing plant in background. Ramp for sand loading at right.

At the Pinopolis Dam site all aggregates are stored in stockpiles, separated by wooden partitions over a reclaiming tunnel. Gravel is received in railroad cars and a steam locomotive pushes these cars 2 or 3 at a time on a 500-foot wooden trestle from which their contents are discharged into the proper storage compartments. Sand is received in trucks which discharge their loads from ramps into railroad cars which are then unloaded to storage in the above-described manner. There are six ground-storage compartments, the four used for gravel having live-storage capacities of 400 tons each. The coarse-sand compartment holds 300 tons and the fine sand compartment holds 100 tons.

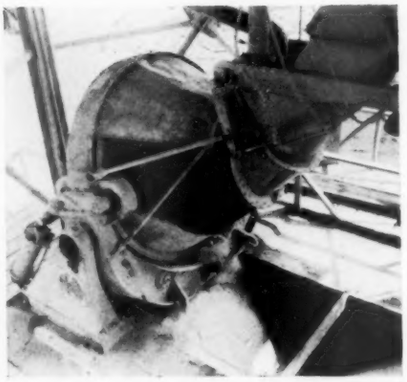
Unloading bulk cement with portable pneumatic pump.

Gates under each compartment control the feed on a 24-inch by 240-foot belt conveyor in the concrete reclaiming tunnel. Only one size is handled at a time and samples for inspection are taken at this point. A 24-inch by 446-foot conveyor takes the aggregates to the top of the mixing plant 68 feet above ground level. A revolving spout controlled by cables from the batching floor feeds these aggregates into 6 of the 7 compartments of the Blaw-Knox circular steel bin. There is storage for 27 tons of fine sand, 37 tons each of coarse sand and cobbles, and 51 tons each of 1½-, 2½- and ¾-inch stone. The seventh compartment holds 500 barrels of cement which is unloaded from cars in bulk by a Fuller-Kinyon portable unloader.

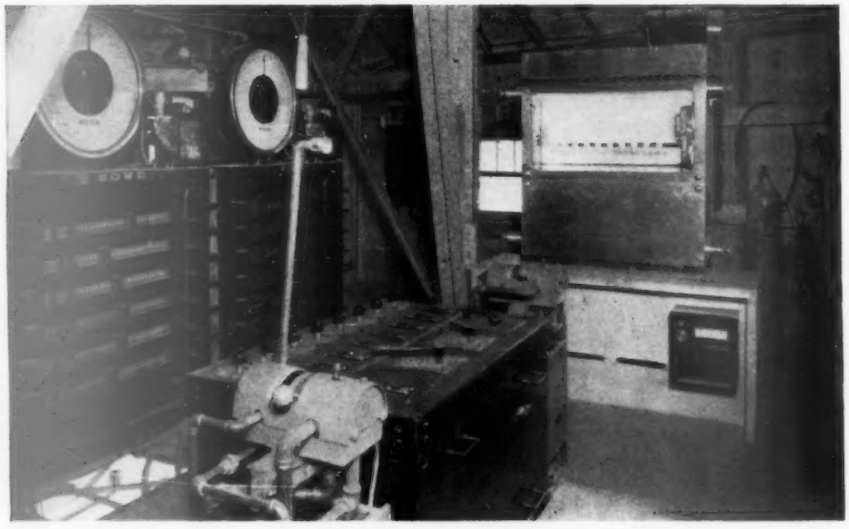
Pinopolis Dam viewed from the top of the concrete plant showing five months progress.

Under each of these seven bin compartments is a separate Blaw-Knox weighing batcher, one for each material. All are filled through automatic air-controlled gates and have Howe dial scales with reading beams and allowance for moisture correction, etc. The batchers for fine and coarse sand, cobbles and cement hold 2,000 pounds each and the other three hold 3,000 pounds each.

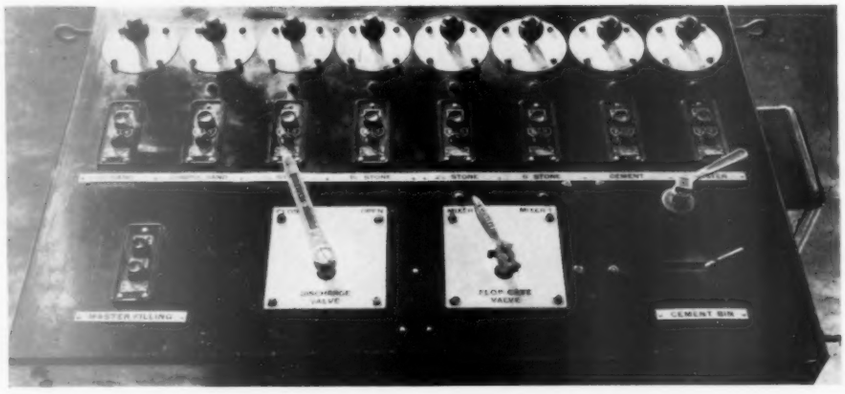
Cement is fed through a 14-inch rotary cement valve to a 12-inch diameter inclined screw feeder with a flushing valve feeding into the batcher. Water is weighed in a 125-gallon capacity tank. These batchers are also equipped with Howe dial scales with reading beams. Aggregates and cement are discharged by means of automatic air-operated batcher gates into a split chute with an air operated gate which alternately feeds the two 2-cubic yard Koehring tilting mixtures. These mixers are tilted by air cylinders and their feed chutes are automatically retracted when the mixers are discharged and moved back into place for loading. A grating in the batching floor makes it possible for the operator to watch the operation and discharge of the mixers. Both mixers discharge into a 11-cubic yard steel collecting hopper from which concrete is loaded out through a roller-type, air-operated discharge gate. Concrete is hauled to the dam in 2-cubic yard Blaw-Knox roller-gate buckets mounted two on each flat-body truck.



One of the two 2-cubic yard tilt-type mixers with feed and discharge chutes.



Scales and central panel control board. Automatic graphic recorder at right in background.



Looking down on the central panel control board.

A feature of the mixer installation is the fact that it is mounted on a separate concrete foundation independent of the bin foundations. This eliminates vibration in the plant.

The plant is one of the first to use the Blaw-Knox automatic graphic recorder, a remote-type instrument which continuously records the weights of the various ingredients and the consistency of the concrete in each batch. The operator of a plant such as this cannot watch each of the individual scales to see that it is functioning correctly and accurately for each batch under automatic batching. The permanent record provided by this instrument makes it possible for the operator to see at a glance if anything is out of order and make the necessary adjustments or repairs at once.

This instrument is essentially a large recording meter with a continuous traveling chart. Individual pens electrically connected to each of the eight aggregate, cement and water batcher scales make a permanent record of the contents of each batch of this chart. Another row of pens rules the paper with vertical lines for points of orientation for each of the weighing pens. The result is a complete graphic record of the successive operations of each of the batching units.

There are also two pens which record

the consistency of the concrete in the mixers as it is being mixed. These pens are actuated by recording wattmeters which are connected to the motors operating the concrete mixers. An automatic time-stamping device

Shown here are the cement screw, fine-sand batcher, and air-operated gate.

prints the time of day on the chart at 15-minute intervals.

All of the control and recording equipment in this plant is conveniently located for the operator. Batchers are loaded, weighed and dumped automatically in sequence by means of a control board which is the heart of the plant. On this board is a master filling push-button which starts an automatic sequence filling all eight batchers. A master discharge valve discharges the contents of the batchers. A flop-gate valve diverts the discharge of the aggregates, cement and water to either of the two mixers. A valve controls aeration of the cement in the bin to prevent arching. In addition to the above this board has a push-button and an on-and-off switch for each of the eight ingredients so the operator can select the ingredients for any batch. All ingredients not wanted are eliminated by turning their switches to the "off" position.

Another feature of this board is the row of selectors, one for each of the eight ingredients. Each selector has six positions for six different mixes of concrete. If, for example, each selector is turned to the No. 2 position, then automatically when the master filling button is operated, the No. 2 concrete mix will be turned out. With this system it is possible to select automatically and instantaneously any one of six mixes.

Opens Block Plant at Marion, Indiana

A new entrant into the concrete-products field is the Marion-Ashlar Cement Block Manufacturing Company, which has just started operating at its new plant in Marion, Indiana. The plant structure, built of cinder blocks, houses equipment which can produce 2,000 units daily.

Cinder, Waylite and gravel blocks are being made.

Pipe Line to Bring Gas to Calaveras

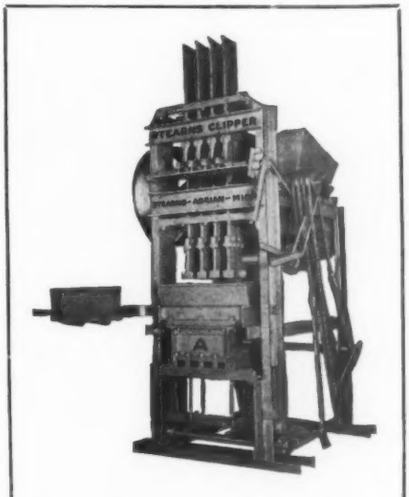
The new 62-mile pipe-line, which will bring natural gas from Rio Vista to the plant of the Calaveras Cement Company at San Andreas, California, is now being laid and prospects are that the $500,000 project will be completed by the end of the year.

The gas will replace oil for firing the rotary kilns. It is estimated that about 5,000,000 cubic feet will be consumed daily when operating at capacity. At present from 800 to 1,000 barrels of oil are used.

Equips Gravel Plant to Serve Aqueduct

The Rosoff Sand & Gravel Corporation of Kerhonksen, New York, has taken delivery on part of a $65,000 order for equipment for its new sand-and-gravel plant to supply material for the new Delaware Aqueduct. The machinery was supplied by the Smith Engineering Works of Milwaukee.

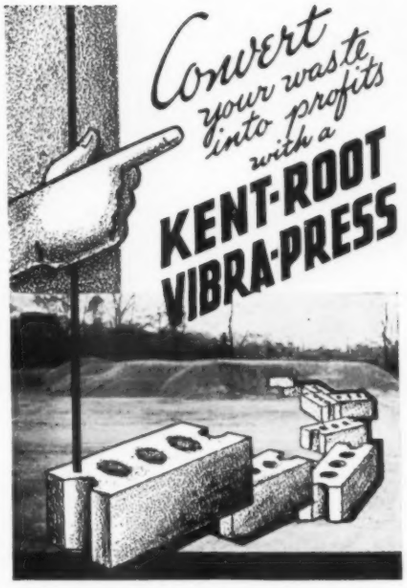
The new plant will have a capacity of about 300 tons per hour.



The Clipper Stripper, shown above, available in 5 models, is only one of the popular machines in the ANCHOR Line of Complete Equipment for the Concrete Products Plant. ANCHOR Engineering Service in the design of new plants or revamping older operations is nationally famous. Consult us before you buy equipment or modernize your plant . . . it costs no more.

Hobbs block machines, Anchor tampers, Anchor, Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers and pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager Columbus, Ohio



Certain sizes of gravel and stone, while excellent for good fine concrete blocks, accumulate quickly in your stock piles because of little or no demand.

Write Kent Machine Co. for details on this amazing way to turn waste into profit.

Why not utilize this stone and gravel by making concrete blocks?

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The user of cored pallets is not limited as to the range of core sizes. He buys cored pallets with the maximum air space and produces blocks with smaller air space by using shouldered cores.

THE COMMERCIAL SHEARING AND STAMPING CO.
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The CONCRETE MANUFACTURER

Aggressive Selling Creates a Demand for Lime Putty, Ready-Mixed Concrete

THE Pennsylvania Supply Company of Harrisburg, Pennsylvania, under the direction of Walter M. Mumma, manager, has built up an enviable reputation in the building industry in that area and among contemporary producers. Beginning in 1921 as a dealer in sand, cement and plaster, this firm has expanded until it is now in a position to supply almost anything needed in construction, to a large extent from its own plants. The list of products now includes sand and gravel, crushed stone, bituminized aggregates, ready-mixed concrete, precast concrete joists, lime putty and mortar. The company also engages in certain types of contracting which do not compete with the building contractors who are its best customers.

The lime-putty and mortar plant with sand hopper, elevator, bin and batchers at left.

The first step taken by the company to produce building materials was made in 1929, when a ready-mixed-concrete plant was erected at the original main yard. In 1931 a sand-and-gravel plant was built at Highspire, seven miles southeast of Harrisburg. This is operated by the Highspire Sand & Gravel Company, a subsidiary. In 1934 a concrete-batching plant was installed at Highspire to supply a large construction project. It is used occasionally for similar work.

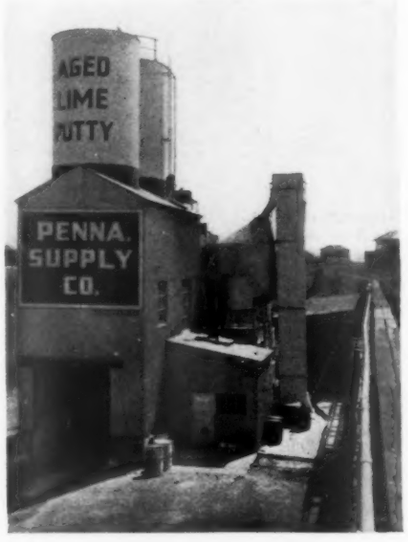
In 1933 a crushed-stone plant at Hummelstown, ten miles to the east, was purchased and an aggregate-bituminizing plant was built. These are operated as the Pennsylvania Supply Company.

In 1934 highway construction was added to the list of activities and a subsidiary, the Walter M. Mumma Road Construction Company, was formed. Among the large jobs handled was a $500,000 contract for 6½ miles of concrete highway in western Pennsylvania.

In 1937 another concrete-batching plant was built north of the downtown section of the city to make possible economical delivery within a radius of 15 miles or more in every direction. Also in November, 1937, a standard 2-tank Brooks-Taylor lime-putty plant, with batching equipment for the production of lime mortar, was installed. In July, 1938, a joist machine was set up at the Highspire plant. Its product gained immediate acceptance and filled another gap in the company's line of building materials. In May, 1939, the manufacture of concrete septic tanks was begun. The latest step was the rebuilding of the Highspire gravel plant.

The lime-putty business was a success from the start because it met a long-felt need and because of the aggressive sales policy of the company and its high standing among builders. The first job supplied was a large apartment building in which high-early-strength cement was used. Over 200 cubic yards of lime putty was used and, in spite of the fact that this work was done in the middle of the winter no efflorescence or leakage developed. With this start it was not difficult to sell other jobs of all sizes and the product now practically sells itself. This business has proved very successful and as much as 35 cubic yards of putty has been sold in one day, most of it in the form of mortar. The daily average has been over 25 cubic yards. On most of the large jobs ready-mixed mortar is used, and on only the smallest jobs now is putty bought and mortar mixed on the job.

Lump lime is received in trucks from a local producer and is discharged into the apron of an elevator feeding into the slaker-feed tank. A side chute in this tank makes it possible for the company to fill small orders for lump lime. The pug-mill-type slaker is first filled with water to a point 9 inches below the desired level. Lime is added until the desired consistency is approached and the temperature reaches 165 degrees F. on the recording thermometer. By this time the desired level has been attained. A few minutes later, and from 15 to 20 minutes after the slaker is started up, the mixture is discharged gradually over a vibrating screen which removes the lumps, the drawing-off process requiring about 30 minutes. A Deming 2-inch pump feeds the mixture to the tank being filled. From 18 to 20 batches are required to fill a tank, which holds about 80 cubic yards of finished putty. After a tank is full the water in it is allowed to drain off for 36 hours at the end of which time the level drops 6 to 8 feet and there is enough space for two more batches. Adding more putty on the top of this is not advisable as the putty on the top would remain wet and funnel out first when the drawing is done. Good putty can be obtained in 8 days, but at least two weeks of aging is preferred.



The lime-putty plant, with the lime elevator and tank at right.

Sand for mortar is discharged from trucks on a ramp into an 8-cubic yard steel hopper from which an inclined bucket-elevator feeds a 70-ton, 2-compartment steel bin. Johnson volume batchers are used under each compartment. Sand is first loaded into the truck-mixer which is then moved a few feet forward and lime putty is discharged on the top of the sand. In summer the cement required for each load of lime mortar is carried in sacks on a platform on the side of the mixer body to be added at the job. In winter it is dumped into the mixers at the plant.

The richest lime mix yet produced

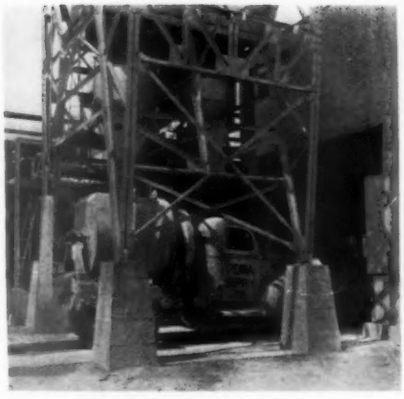
One of the new 2-cubic yard high-discharge mixers at a job.

contains 1 part of lime putty to 3 parts of sand and 1/10 of 1 part of cement. This mixture is made for concrete-block basement walls, where resistance to moisture penetration is important. The richest cement mix used contains 1 part of lime putty, 1 part of cement and 6 parts of sand.

The truck fleet operated by the company includes 20 truck-mixers. These comprise Jaeger, Blaw-Knox, Chain-Belt Rex, Smith and Concrete Transport mixers, most of which are 3-cubic

One of the new truck-mixers being loaded.

yard units mounted on Autocar truck chassis. The four Smithmobile 2-cubic yard mixers were purchased about a year ago. The four 1-cubic yard Concrete Transport mixers are used chiefly for mixing and delivering lime mortar but are also used for concrete when needed. In the same way the larger



Sand being batched into one of the open-top mixers for lime mortar.

truck-mixers help out on lime-mortar and lime-putty deliveries when there is a "peak" in the demand. Dump trucks are never used for delivering any of these three products.

The company also has 57 other trucks, most of them equipped with dump bodies which are used for the delivery of aggregates, building materials of various kinds, reinforcing steel, etc. At times some of these trucks are used on the company's construction projects.

The ready-mixed-concrete business has also been good. Many large contracts have been filled and there is a steady demand from small users. In selling concrete the company has found that it pays to make the product easy to use. Portable conveyors are supplied to contractors for making elevated pours, such as those on second floors. The company also furnishes Universal 30-inch by 8-foot plywood forms complete with steel braces and finds that this service helps sell concrete. Contractors find it economical to rent these forms at a cost of 2 cents per square foot.

About a year ago the company built a model house in which most of its products and the building materials it sells were used. This house has a poured-concrete basement, brick-and-mortar walls, concrete joists on the first and second floors with an exposed beam ceiling. The garage in connection has a concrete-beam roof with a solarium above. Other materials supplied included rock-wool insulation, glass bricks, double-hung steel windows, the fireplace, etc.

FOR SALE

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FASTEST LOADING, FASTEST MIXING AND FASTEST HIGH DISCHARGING TRUCK MIXER ON THE MARKET . . .

NEW DRUM SIZES BOOST PAYLOAD

Latest development by world's largest mixer manufacturer — mobile 2, 3 and 4 yd. concrete plants that cut placing costs, deliver proven higher strength concrete. One-Shot Top Loading, 2-Speed Mixing, Vacuum Controlled Discharge, many other features. GET CATALOG, PRICES, EASY TERMS.

HIGH DUMP MIXERS

2, 3, 4 Cu. Yd. Sizes. 2 Yd. Size Mounts on Short Wheelbase Ford-Type Trucks

Also STANDARD HEAVY DUTY MIXERS

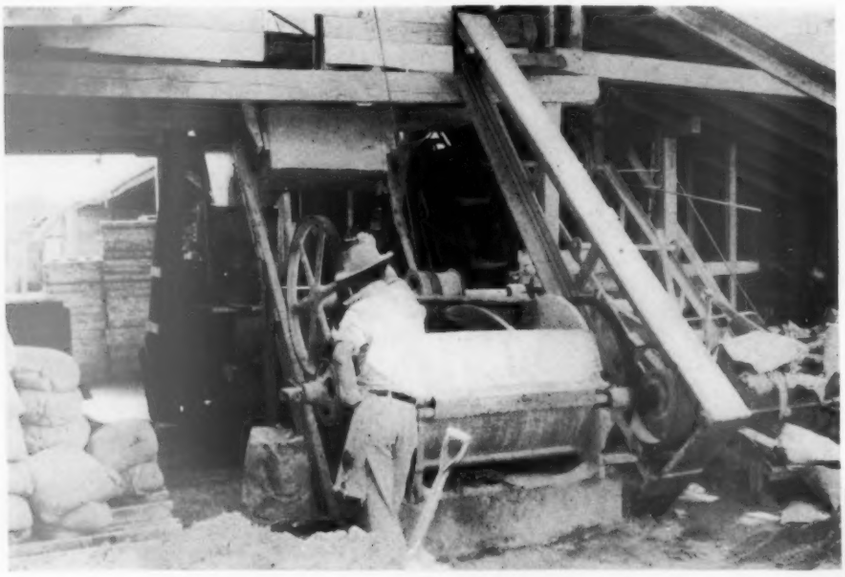
up to 5½ Cu. Yds. (7½ Cu. Yd. Agitators)

THE JAEGER MACHINE CO., 602 **Dublin Ave., Columbus, Ohio**

The CONCRETE MANUFACTURER

Sells Concrete Brick Through 40 Yards in San Antonio Area

Part of the brick-storage yard. Plant in background.



The mixer and skip serving the brick machine.

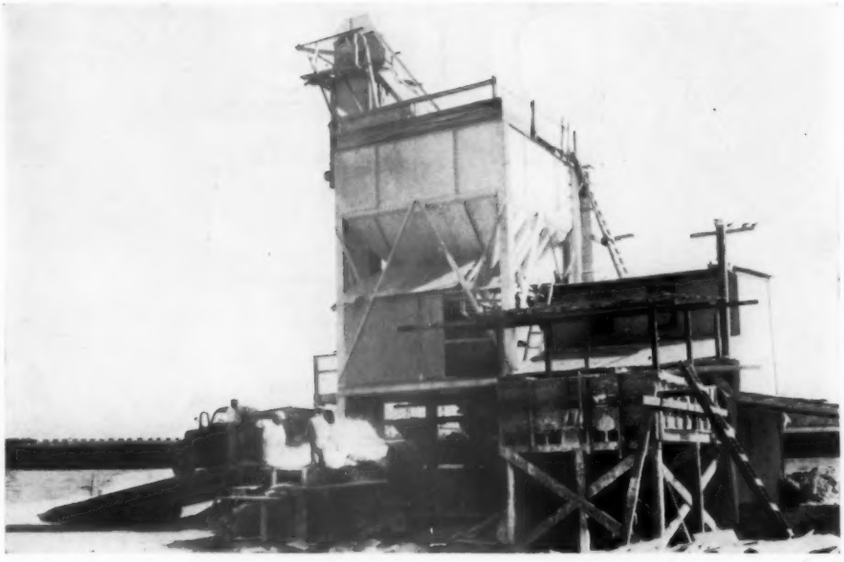
ADAPTABILITY to changing conditions is one of the primary requisites if one is to stay in business these days. A. P. Turner, president and general manager of the Turner Gravel Company, San Antonio, Texas, has this quality in large measure, judging from the history of his company. In 1922, after dabbling for several years with the production of a concrete tile, he began the production of sand and gravel and at one time operated three plants. Now only one plant is operated because prices have dropped so low in this area that Mr. Turner finds it cheaper to buy than produce. The company's products have been increased in number from year to year and now include sand and gravel, ready-mixed concrete, lime putty and ready-mixed lime mortar, Dunbrik, Dunstone and other concrete building units.

Back in 1918 the company had operated a stone-tile plant and in 1922 an Ideal dry-tamp block machine and a hand-operated brick machine were installed. In 1929 a power brick machine was bought and this was replaced in April, 1939, with a Dunbrik machine. The dry-tamp machine was retained and is now used to make 4- and 8- by 5- by 12-inch blocks, corners, jamb tiles and other "specials." The stone-tile machine was sold to a mining company in Mexico which used it to build houses for its employees.

The Dunbrik and Dunstone, because of their lighter weight and lower price have been able to compete in this clay-brick area where stone tiles and solid bricks could not. An order was recently filled for 250,000 bricks for new barracks at Kelly Field, the famous "West Point of the Air." A very satisfactory demand for these units has been built up and is rapidly growing. Sales are made through over forty lumber yards in San Antonio and its vicinity. The company's other products are sold both through dealers and direct.

The Dunbriks and Dunstones are made in many different colors and finishes. This wide range or colors is due in part to the fact that golden, red, buff and nearly-white sands are available locally and these can be blended with pigments to make many attractive shades. The Dunbrik plant is of standard design. A Besser mixer serves both machines.

The brick machine in operation.



The Turner lime-putty and concrete plants.

Mr. Turner was among the first to visualize the possibilities of ready-mixed concrete. In 1929 a plant was built at the company's yard in San Antonio to supply the commercial demand. A temporary batching plant was built at Randolph Field to supply the concrete used in building that army air field. The truck fleet originally consisted of four Paris 2- and 3-cubic yard Transit mixers, but five more were added within three months. The latest additions to the fleet are two 1½-cubic yard T. L. Smith mixers. These and the older mixers are mounted on Federal truck chassis or trailers. The original plant at the yard was replaced a few years ago with a modern Butler bin and batching plant. Concrete is sold on a service basis in quantities down to a fraction of a cubic yard.

The company's most recent venture is a ready-mixed lime-mortar plant. A small plant was completed in September, 1939, and was an immediate success. Among the early orders was one for 2,500 cubic feet for a W.P.A. project. As a result of growing demand a larger plant was built. This consists of a 1-sack horizontal blade-mixer, a stationary screen and a 1½-inch pump serving the six 6-cubic yard aging vats. Sand is added in the truck-mixers from an adjacent batcher bin. Cement is delivered on the same trucks and contractors do their own tempering at the job.

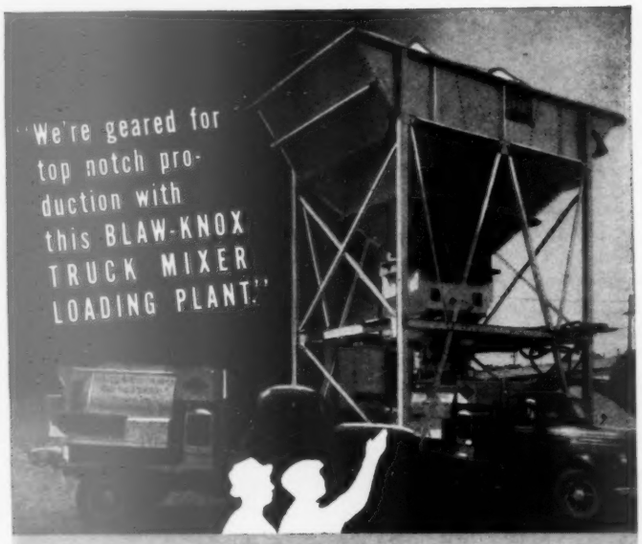
Opalite pulverized silica waterproofing admixture made by the Corona Products Company is used in mortar and concrete. Mr. Turner has developed a special mortar using only Opalite, sand, and cement. This mortar, according to Mr. Turner, has the workability and water resistance of a lime-sand mortar without its shrinkage.

Builds Lime Plant

The McGann Manufacturing Company, Inc., of York, Pennsylvania, is building a complete lime-kiln outfit with auto skip-hoist, exhaust system, etc., for a Peruvian client of the Lime & Hydrate Plants Company of York. This kiln is designed to burn bagasse and is said to be the first such kiln to use waste fuel.

Spouts DRY CONCRETE Where You Want It
Saves Time — Reduces Costs — Adds to Profits
Smith-Mobile's high point of discharge enables you to spout the concrete directly into high forms. No waiting for wheelbarrows. No need to push the concrete down the chute. Even DRY concrete can be spouted right into place. And all this can be accomplished without the use of a rear end hoist. Investigate Smith-Mobile's many features... VISIBLE MIXING . . . FEED CHUTE CHARGING . . . CONTROLLED DISCHARGE . . . etc. Write for literature.
THE T. L. SMITH COMPANY, 2887 N. 32nd St., Milwaukee, Wis.
HIGH DISCHARGE
. . . LONG, STEEP SPOUT
SMITH-MOBILE
The Modern
TRUCK MIXER and AGITATOR

The CONCRETE MANUFACTURER



Blaw-Knox is the only manufacturer offering complete equipment for ready mixed concrete; including Trukmixers and Agitators, Ready Mixed Concrete Plants and Truck Mixer Loading Plants of all capacities and types.

Send for Blaw-Knox Catalogs Nos. 1566 and 1582.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

BLAW-KNOX *Truck Mixer* **LOADING PLANTS**

QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with *Quinn Pipe Forms.* Quinn Pipe Forms can be handled by less experienced labor and produce uniform concrete pipe of highest quality. The recognized standard of all concrete pipe.

HEAVY DUTY CONCRETE PIPE FORMS

Built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell end pipe — any length. Backed by years of service in the hands of contractors, municipal departments and pipe manufacturers.

***NEW* MEDIUM DUTY CONCRETE PIPE FORMS**

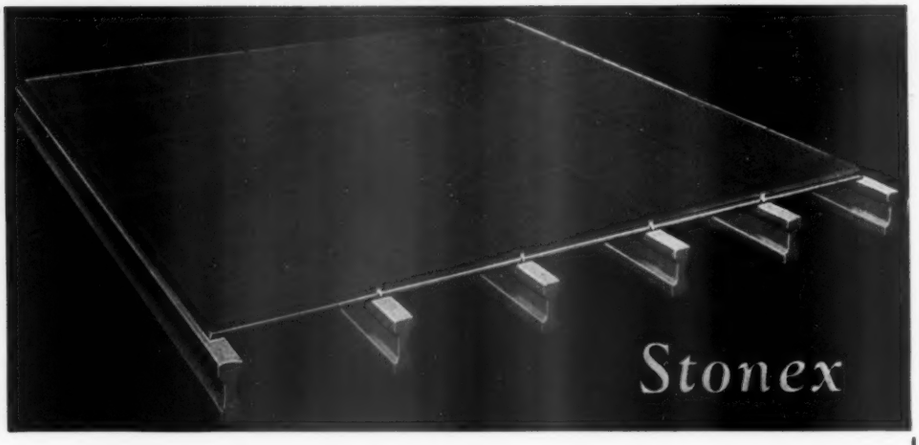
Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. Complete in every way. Stands up on any job. Same sizes as "Heavy Duty," from 12 to 84 inches—any length.

Write Today

Get complete information on prices and Special Construction features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs.
Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS
1627 TWELFTH ST., BOONE, IOWA

HERE'S A NEW *LOW-COST* CONCRETE FLOOR



Here is a practical answer to the question "How can we get a good low-cost, finished concrete floor?

Precast concrete joists open the door to the low-cost floor market. STONEX clinches the sale by solving the problem of a floor finish.

The illustration above shows how simple the tile are to place . . . the speed with which a floor can be completed . . . the distinctive result that is obtained, at an amazingly low cost.

The new and exclusive STONEX process enables products manufacturers to produce—at low cost—tile of all shapes, sizes, and for all purposes . . . tile that are harder than granite, as proved by laboratory tests . . . in beautiful colors; all shades, tones and blends, that are an integral part of the tile itself.

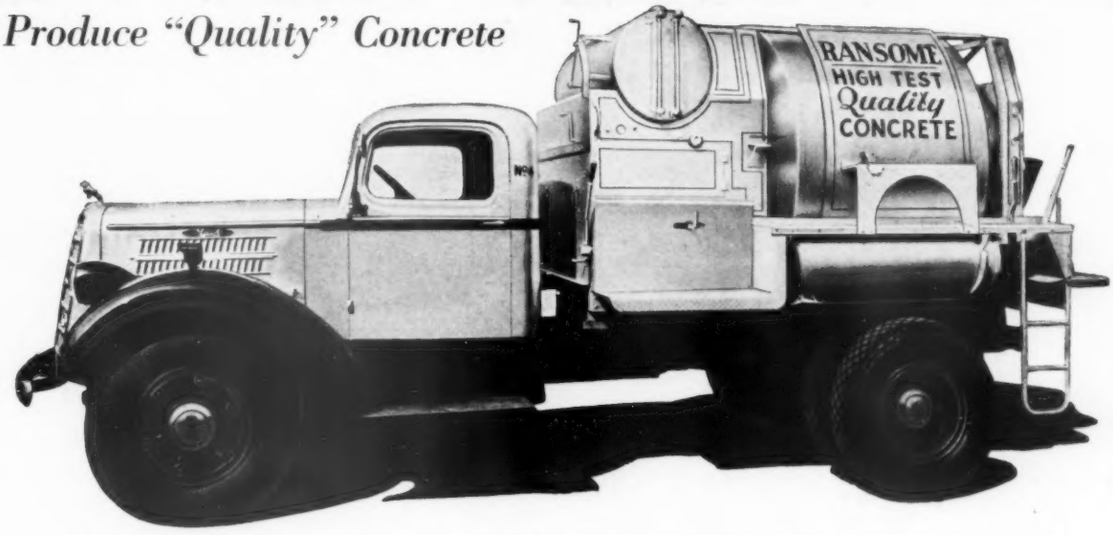
The system has been perfected and proved by test and job experience. It is all ready for alert products manufacturers to merchandise. It is just what you need to win your local floor business.

Write today for more details about STONEX process and our plan to license manufacturers to make and sell this system

STONEX INDUSTRIES, 210 Seventy-First Street, Miami Beach, Florida

BUY YOUR TRUCK MIXER

to Produce "Quality" Concrete

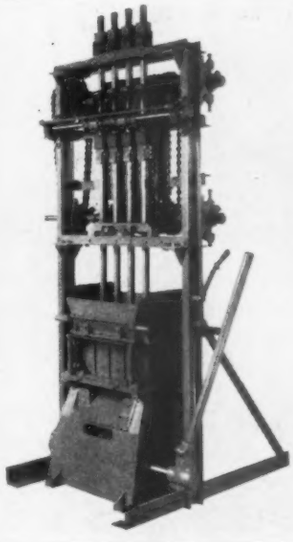


If you have not examined or had all the facts pertaining to Ransome exclusive features, then you have missed the "latest" in truck mixer design.

Write today for the facts

Ransome TRUCK MIXERS & AGITATORS

RANSOME CONCRETE MACHINERY CO. Dunellen, New Jersey



Miles CONCRETE EQUIPMENT

HIGH Production

LOW Investment

INVESTIGATE before you buy any make of equipment

WRITE FOR CATALOG

Complete information on our entire line of pioneer MILES EQUIPMENT will be sent without obligation.

THE MILES MANUFACTURING CO.

Department 21

JACKSON, MICHIGAN

THE BROOKS-TAYLOR *Lime Putty Plant*

THE Heston lime putty plant, shown above, was installed in May, 1938. After operating one year, the capacity was doubled and central mixing facilities added, enabling the company to supply its customers in Indianapolis and vicinity with mortar made with aged lime putty produced by the Brooks-Taylor process. Write for information on a plant for your city.

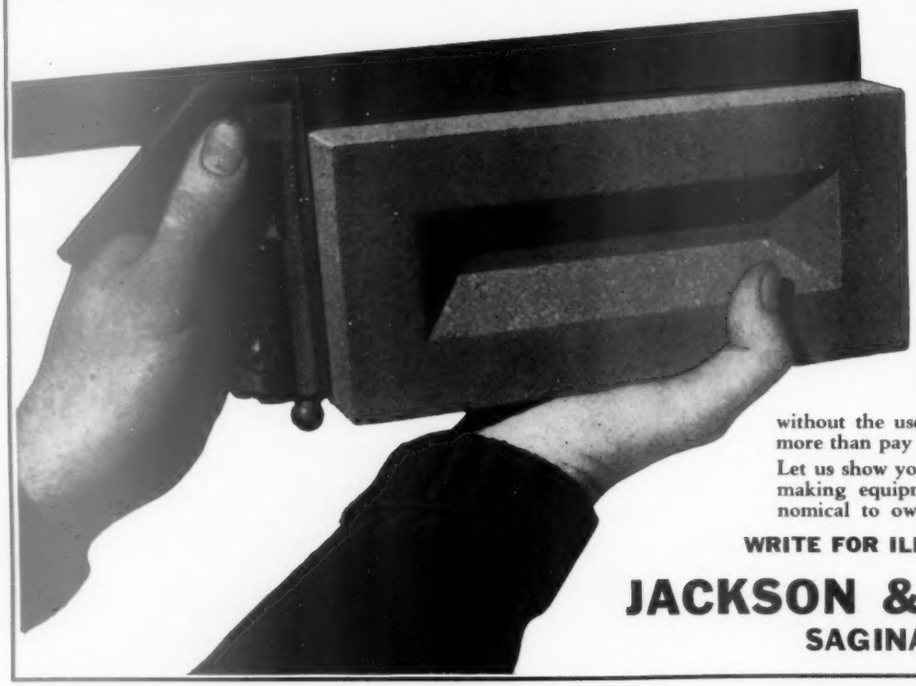
CHICAGO BRIDGE & IRON COMPANY

Chicago ....2451 McCormick Bldg.	Tulsa .....1648 Hunt Bldg.
New York.....3389—165 Broadway	Birmingham.1503 North Fiftieth St.
Cleveland....2264 Rockefeller Bldg.	Dallas.....1686 Praetorian Bldg.
Philadelphia.1645—1700 Walnut St.	Detroit.....1552 Lafayette Bldg.
Boston.1550 Consolidated Gas Bldg.	San Francisco....1092 Rialto Bldg.
Houston.....918 Richmond Ave.	Los Angeles...1457 Wm. Fox Bldg.

In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

ABSOLUTELY THEY ARE

EVERY BRICK MADE ON THE JACKSON MACHINES IS SQUARE AND TRUE TO SIZE, MORE UNIFORM AND OF BETTER QUALITY



Producers using the JACKSON concrete brick machines are outselling their competitors. Their profits are greater because their operating and maintenance costs are lower.

The JACKSON brick machines have been in use for over 25 years, they are hard to wear out and will pay for themselves over and over again.

Completely automatic, no slowing down. Day in and day out these machines turn out an endless stream of concrete brick. Production set by the machine, not by the labor.

No other concrete brick machine on the market today makes brick without the use of pallets. This feature alone will more than pay for the machine in a very short time.

Let us show you why the JACKSON concrete brick making equipment is the most efficient and economical to own.

WRITE FOR ILLUSTRATED FOLDER

JACKSON & CHURCH CO.
SAGINAW, MICH.

Tons *for pennies . . .*

With a SAUERMAN Power Drag Scraper you can actually move tons for pennies! You can dig from pit, pond or bank—or handle materials to and from storage piles with surprising economy, with safety and convenience, and with less maintenance trouble and labor cost than any other method.

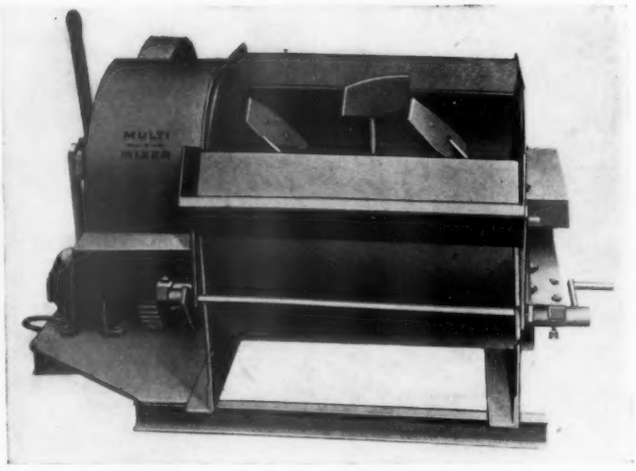
Write today for the complete SAUERMAN Catalog which describes both the Power Drag Scraper and Cableway Excavator and explains the low cost simplicity of this flexible and dependable equipment. There's a SAUERMAN Machine to meet your requirements—at an installation expense that starts and ends as an excellent investment.

for . . .
SAND
GRAVEL
STONE
COAL
ORE

Write for Catalog

SAUERMAN BROS., INC.
434 S. Clinton St. Chicago, Ill.

MULTIPLEX
MULTI-MIXER



- All-steel, welded frame
- Enclosed drive gears running in oil
- Shafts mounted on roller bearings
- No costly clutches or belts to replace
- End discharge door gives access at all times
- New design mixing paddles for quicker mix
- Long wearing blades and liners
- Capacities 5 to 40 cu.ft. and larger

THE MULTIPLEX CONCRETE MACHINERY COMPANY
Elmore Ohio

See WOODSTOCK TYPEWRITERS

"NAT-ALOY" LOCK CRIMP MESHES ASSURE ACCURACY FOR THE LIFE OF SCREEN

"LONG WEARING"

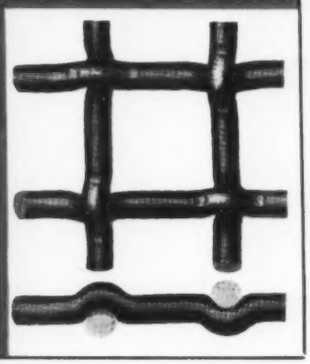
TOUGH SCREENS THAT RESIST ABRASION, WILL NOT CRYSTALIZE.

FURNISHED ALSO IN FLAT TOP AND DOUBLE CRIMP MESHES.

STOCK SHIPMENTS

WRITE FOR NEW CATALOG NO. 51

National Wire Cloth Co., Inc.
152-270 W. Fairfield Ave., St. Paul, Minn.



INFRINGEMENT NOTICE

To Builders and Users of Block Machines:

Please take notice that the Stearns Manufacturing Company of Adrian, Michigan, are the sole and exclusive licensees of "Joltcrete" vibration block machine patents and patent rights and have the sole and exclusive right to manufacture and sell such equipment.

At the present time there is a suit for patent infringement pending against H. W. Bell Company of New York City, a user of infringing equipment.

Others manufacturing infringing equipment and the users of such equipment will be prosecuted to the fullest extent of the law.

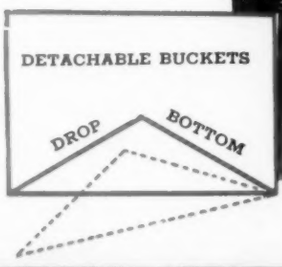
LOUIS GELBMAN, *Inventor*

DEMPSTER DUMPSTER

Tough-Task Giants

Tough tasks and heavy-duty service are accomplished with ease by DEMPSTER-DUMPSTER Models 300LF and 400LF—the rugged giants of the DEMPSTER-DUMPSTER line. A single unit serving as many as ten detachable buckets, each up to 6 cubic yards in capacity, does the work of five trucks at far lower cost. Simply constructed of the most rugged materials available, DEMPSTER-DUMPSTERS have served faithfully year after year in many operations without a major breakdown. Write for the facts today. Just ask for Bulletin No. 501.

- No High Pressure Hose
- No Counterweight
- No Auxiliary Jacks

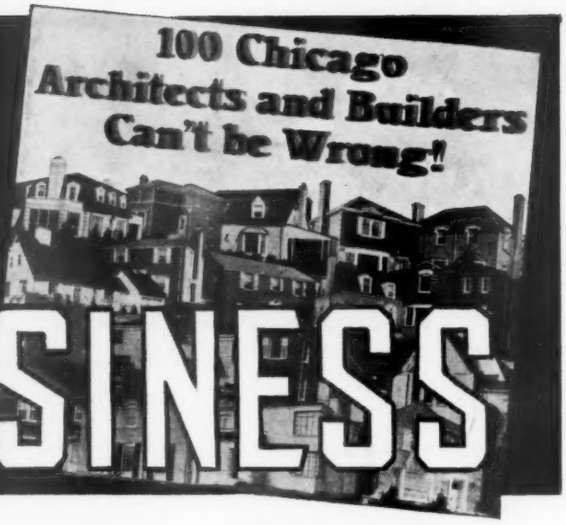


Above is Model 300 LF (3 cu. yds. water level).

DEMPSTER BROTHERS, Inc. KNOXVILLE, TENNESSEE

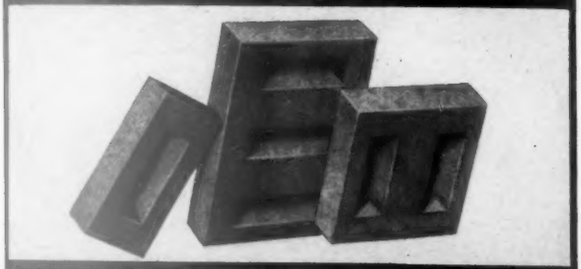
The CONCRETE MANUFACTURER

Carlsen's FORESIGHT BUILT a BUSINESS



Automatic line production, assuring highest quality of products at lowest labor cost.

Direct from factory to job delivery, lowers cost, builds good will through efficient service.



Standard and multiple sizes, provide wide choice of structural and architectural design.

Full range of color enables each local DUNBRIK Manufacturer to serve the complete market.

Two years ago Mr. C. L. Carlsen of Chicago started manufacturing DUNBRIK and DUNSTONE. He has already achieved manufacturing success. Today he numbers among his regular customers most of Chicago's prominent residential builders. His success fully justifies his foresight and his belief that the greatest need in modern building is a better masonry material at a fair price.

In DUNBRIK Carlsen found the answer. Greater strength—lighter weight—absolute accuracy—keyed mortar bond—water repellent faces and the most complete range of colors, shades and textures. Factory to job delivery and a low manufacturing cost through automatic line production and the ability to utilize local low-cost raw materials.

With his products and cost advantages Carlsen has become the dominating supplier of quality masonry materials in his locality. The growth of his business is based on the soundest fundamental—quality at a fair price.

You, too, can build a substantial manufacturing business of your own, offering big future possibilities. Make the first step today. Write at once. Let us show you through our free book "4 Keys to Success" how you can start an exclusive franchise protected business on a modest capital.

W. E. DUNN MANUFACTURING CO.
450 West 24th Street
HOLLAND MICHIGAN

See page 69 of August 1940 issue of PIT AND QUARRY for full details on the success of Chicago DUNBRIK by George MacNeill.

TY REDUCTION CRUSHER

When a new crusher sells in ever-increasing numbers for years on end—in a half dozen sizes, to operators located all over the world, who are engaged in a score of different industries, it certainly must have "a lot on the ball."

This result was achieved by a sort of super-salesmanship — on the part of the TY itself—appealing to the desire of owners for equipment that can be depended upon—at all times and under all conditions—to deliver wanted output regularly, in adequate quantity, at profitable cost.

It's the design that does it—strength to spare and so simple that anyone can understand it, scientifically lubricated, protected against dirt and grit and from breakage by tramp iron, non-chokable crushing parts that save power, reduce maintenance and boost production. In other words the machine has "what it takes," with all of the troubles left out.

Our representative has many interesting facts to tell you, and our Bulletin 2112 contains full details. Both are at your call. Write us today.

INVESTIGATE OUR TYPE H BLAKE CRUSHER (BULLETIN 1105), AND OUR MULTI-STAGE FINE REDUCTION CRUSHER—(BULLETIN 113).

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HOSE • BELTING • PACKING • MOLDED PRODUCTS

TOWER Pneumatic Hose

HOLDS THE AIR LONGER

● It's a long program when you put Republic's Tower Pneumatic Hose on the job—provides long service life in all kinds of heavy-duty pneumatic tool work. Tower is built with the characteristic brown cover that has become famous for showing no signs of punishment, three plies of multiple-braided cords and a highly oil-resistant, non-flaking tube . . . for efficient operation under heavy compressor pulsations and to withstand abuses such as excess abrasion, crushing, presence of oil and harsh weather conditions. This type of rugged construction, without impaired flexibility, makes Tower a valuable piece of equipment in every sense. Its longer performance means minimum cost. Your Republic Distributor is a reliable source of information on this and other Republic Hose. REPUBLIC RUBBER DIVISION OF LEE RUBBER AND TIRE CORP., YOUNGSTOWN, O.

EAGLE

"Swintek" Screen
Nozzle Ladder

GETS MORE DEPOSITS

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By bringing up more deposits at less cost, the EAGLE "Swintek" Ladder increases your profits on every dredging job.

The unit is provided with screening and digging chain with cutters to insure an even, constant feed of solids. Oversize is removed from the pumping zone. The "Swintek" readily works deposits that are inaccessible to plain suction. Slug pumping, of course, is eliminated.

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EAGLE "Swintek" actually increases capacity from 50% to 400% . . . effects major savings in power and avoids labor-time losses due to pumping delays.

Write for Bulletin, "Get Dollars in Your Pockets." Also ask about **EAGLE** Washers, the standard equipment for preparation of aggregates.

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DES MOINES IOWA

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Every issue of PIT AND QUARRY is full of information you can use in your business. It gives you practical ideas on every phase of your operations.

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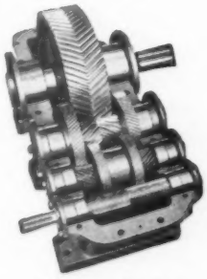
—every type of Herringbone Speed Reducer that you might need

Single Reduction
Type SH

JONES Herringbone Gear Speed Reducers are built in a wide range of ratios and ratings to cover every requirement. Single (Type SH) reducers in standard ratios range from 1.25 to 1 up to 11 to 1 in ratings from 1.3 to 440 H.P. Double (Type DH) reducers are built in standard ratios from 10.9 to 1 up to 72 to 1 in ratings from 0.5 to 275 H.P. The triple reduction reducers (Type TH) cover a range of ratios from 86.9 to 1 up to 355.8 to 1 in ratings from 0.3 to 78 H.P.

Double Reduction
Type DH

All these reducers have heat treated gears, ground shafts and are mounted with anti-friction bearings throughout. Cast iron bases are available for all variations of motor assembly. Liberal stocks are carried to facilitate shipments.



Triple Reduction
Type TH

W. A. JONES FOUNDRY & MACHINE CO.

4441 Roosevelt Rd., Chicago, Ill.

HERE'S THE LATEST INFORMATION

about the application of Herringbone Reducers

This new 128-page catalog of Jones Herringbone Reducers presents a vast amount of data relating to Herringbone Reduction Units. Illustrations show a broad range of herringbone reducer applications and the technical information shows how to select reducers for all conditions of service in accordance with the A.G.M.A. recommended practice.

Write for your free copy of this valuable treatise

Since 1890

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HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS

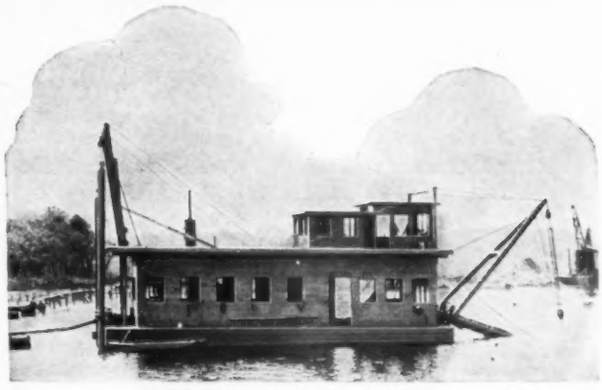
CUT AND MOLDED TOOTH GEARS — V-BELT SHEAVES

ANTI-FRICTION PILLOW BLOCKS — PULLEYS

FRICTION CLUTCHES AND TRANSMISSION APPLIANCES

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



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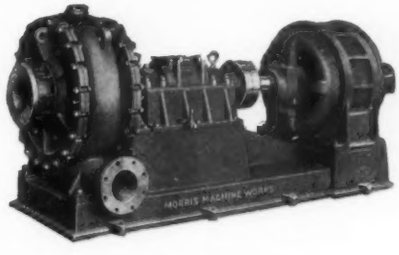
The long list of Morris sand and gravel dredge records is full of examples of speedy, economical and trouble-free service, such as twice the expected sand and gravel production, hundreds of thousands of cubic yards of heavy material without repair expense, greater capacity and dredging depth than obtainable with other equipment, etc. Morris Dredges are furnished for any kind of dredging work and for any operating conditions. Write for dredge bulletins.



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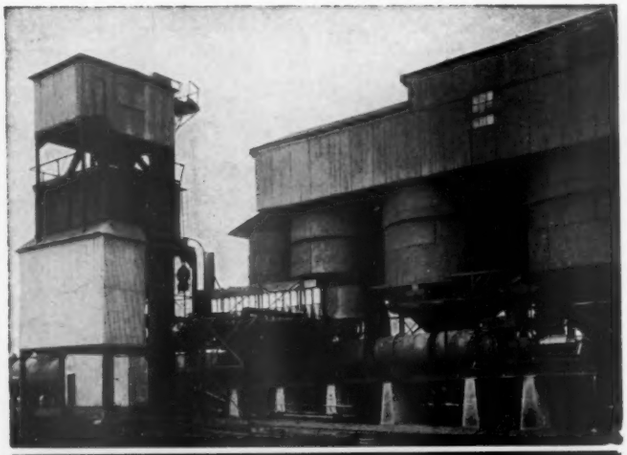

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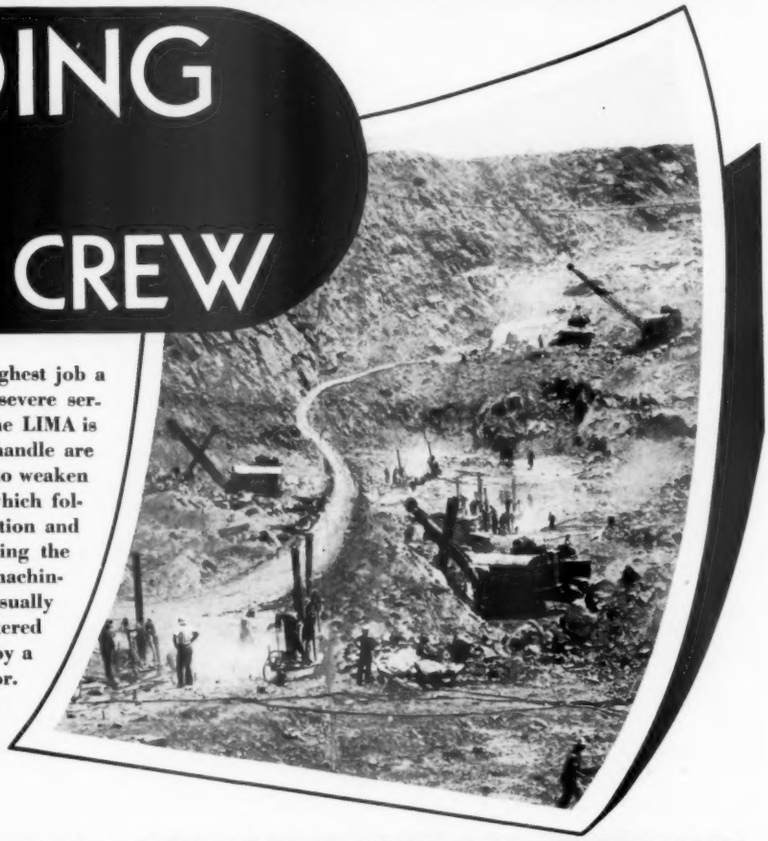

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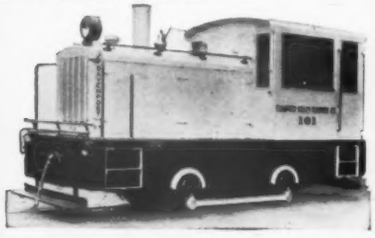

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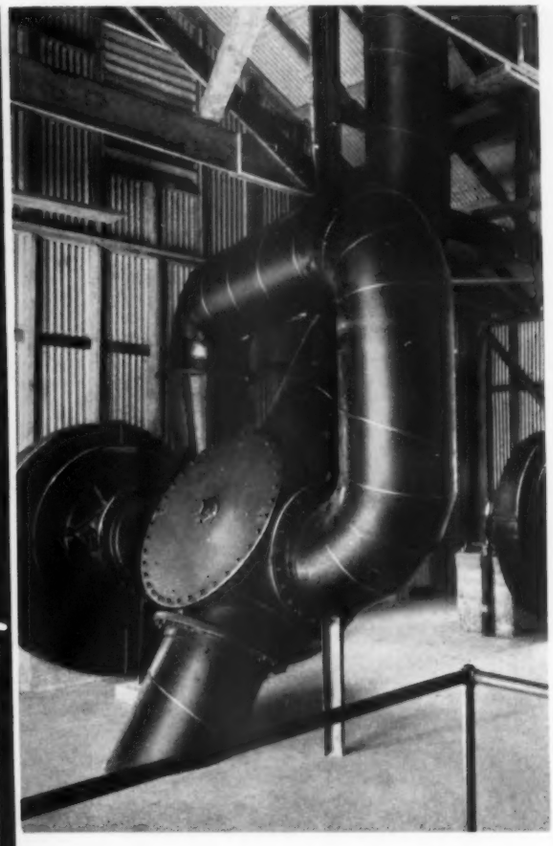

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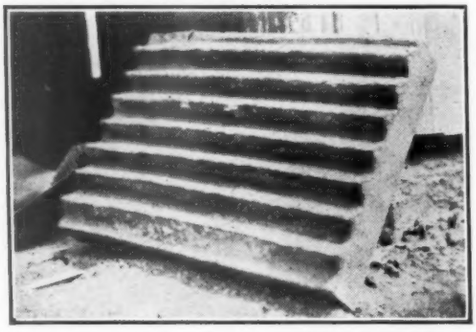

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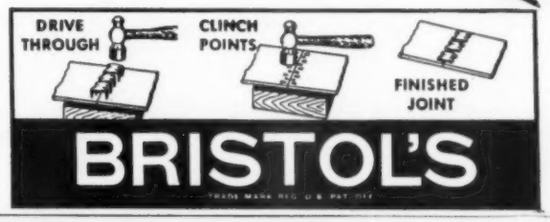

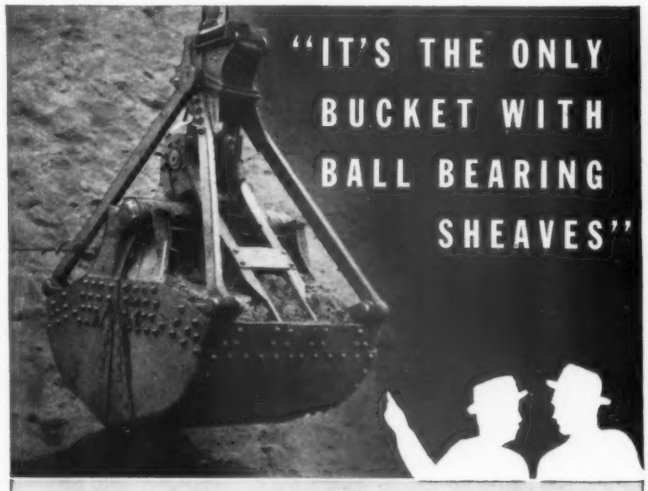

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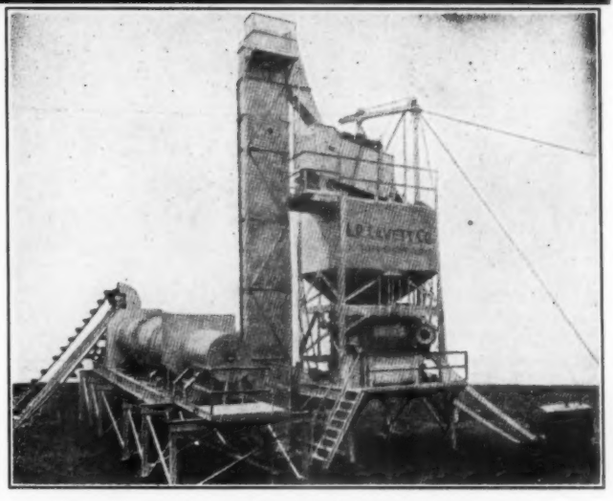

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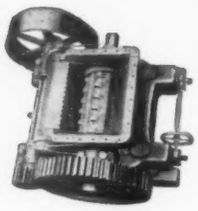

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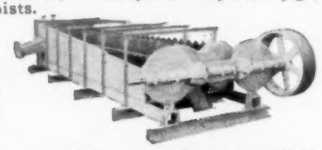

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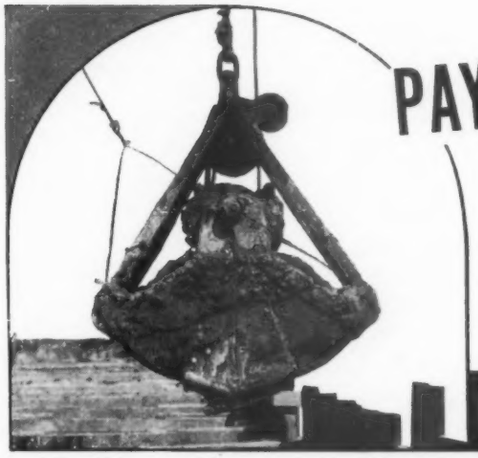

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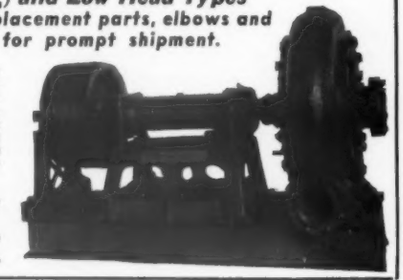

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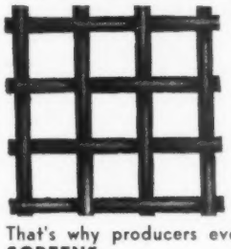

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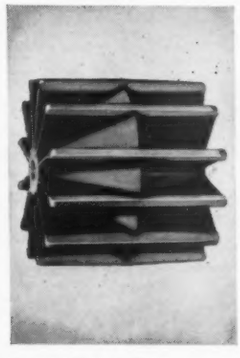

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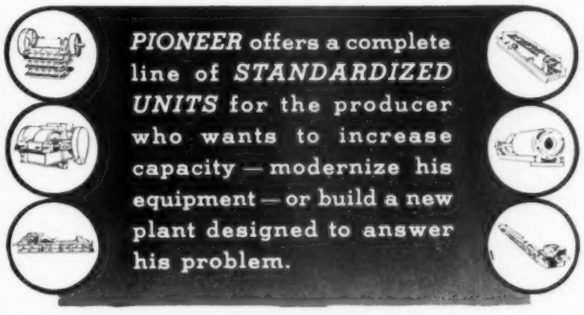

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Complete concrete batching plant, 125 yds. 4 compt. bin, 200 bbls. cement.
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Orange Peel Bucket.
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Shovel Attachment for Thew-Lorain "60", with one-yard Manganese Front Dipper with Teeth.

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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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9—2 compartment bins; 2—118 ton Blaw Knox; 1—75 ton Butler V-40; 3—72 ton Blaw Knox; 1—60 ton Butler V-40; 1—35 ton Blaw Knox portable; 1—26 ton Heltzel portable with Kron dial scale. All above with or without volume or weigh batchers.

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1—Link Belt Mod. K-55 combination dragline and shovel Ser. No. 1698, gasoline power, 70 dragline boom, 2 yd. shovel frame.
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SPECIAL OFFER
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1—Set of Allis-Chalmers, smooth tyle crushing rolls, 42x16".

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1—12" Morris Heavy Duty D. C. to 100 H.P. dbl. cyl. steam engine.
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WHIRLEY
1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75′ boom, 3 D Clyde 80 HP elec. hoist and 30 HP elec. swinger, all complete. Perfect condition.

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Several Vibrating Screens, Bucket Elevators, Sand Classifiers, Electric and Gasoline Motors, 2", 3", 4", 6" Self-priming centrifugal pumps with gasoline motors; 1½", 2", 3", 4", 6" centrifugal pumps with electric motors.

1—Portable Air Compressor, on pneumatic tired wheels, 160 c.f.m. actual air.

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Above compressors are like new, have been used only a few months.

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5 Roll High Side.

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350 Ft. Barber-Greene Sectional Steel Frame Roller Bearing Belt Conveyor. New 1939.

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125 Ton 56' x 10'6" Platform 4 Section.

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5 Clyde 75 to 100 ft. Boom.

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96 H.P. Waukesha Hesselman.
2—370 H.P. Chgo. Pneu. RHA458, 360 rpm.
420 H.P. Sulzer, 1000 rpm.
600 H.P. B. & W., 550 rpm.

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Used Equipment

12'x12'x20' High oversize hopper, sloping grizzly.
20' and 32' Bucket Elevators.
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660 "	30"	6	1/8"	1/16"	"
245 "	26"	5	1/8"	1/16"	"
906 "	24"	5	1/8"	1/32"	"
298 "	24"	4	1/8"	1/16"	"
370 "	22"	8	1/16"	1/16"	Elevator
296 "	22"	8	Friction		"
1455 "	20"	5	1/8"	1/32"	Conveyor
403 "	20"	4	1/8"	1/16"	"
1738 "	18"	4	1/8"	1/32"	"
60 "	18"	8	1/4"	1/16"	Elevator
288 "	18"	6	1/8"	1/16"	"
712 "	18"	4	1/16"	1/16"	Conveyor
1096 "	16"	4	1/8"	1/32"	"
554 "	16"	4	1/16"	1/32"	"
738 "	14"	4	3/32"	1/32"	"
288 "	14"	4	1/8"	1/16"	"
110 "	12"	8	1/8"	1/16"	Elevator
226 "	10"	6	1/16"	1/16"	"

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470 Ft.	48"	8	1/8"	1/16"	Conveyor
210 "	20"	7	Friction		Elevator

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Model 251 Koehring dragline purchased new in 1937. In first class condition.
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Ingersoll-Rand 310 cubic foot displacement air compressor rebuilt. Priced low.
Also many other items of good used equipment.

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CRUSHERS—ELEVATORS—SCREENS
SAND WASHERS—PUMPS
CONVEYORS

1—7½"x13" CHAMPION No. 3 Jaw Crusher.
3—BRAND NEW Jaw Crushers 9"x15" and 10"x20".
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1—12"x26" CHAMPION No. 6 Jaw Crusher.
1—No. 19 KENNEDY Fine Reduction Crusher.
1—Pair 16x10 STURTEVANT Balanced Crushing Rolls.
1—¾-yard WILLIAMS Digging Type Clamshell Bucket.
1—48" dia. x 18' Allis-Chalmers trunnion mounted Screen with steel frame.
2—M-20 QUAKER CITY Hammer Mills.
2—3'x5' LINK-BELT Vibrating Screens.
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90 to 100

Clark G-6, *30-Yard* 50-Ton Air Dump Cars, *down-turning door* type.

Extra heavily constructed.
Floor Plates ½". Steel Wheels.

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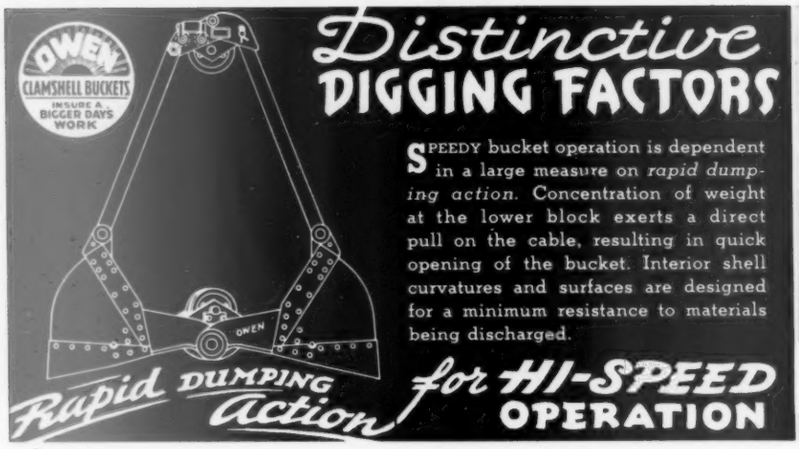
"*Anything* containing IRON or STEEL"



Distinctive DIGGING FACTORS

SPEEDY bucket operation is dependent in a large measure on *rapid dumping action*. Concentration of weight at the lower block exerts a direct pull on the cable, resulting in quick opening of the bucket. Interior shell curvatures and surfaces are designed for a minimum resistance to materials being discharged.

Rapid DUMPING Action for HI-SPEED OPERATION

THE OWEN BUCKET CO.
6050 BREAKWATER AVENUE • CLEVELAND, OHIO
BRANCHES: New York, Chicago, Philadelphia, Berkeley, Cal.

Index to Advertisers

*American Cable Div. American Chain & Cable Co., Inc. ... Inside Back Cover
*American Chain & Cable Co., Inc. Inside Front Cover, Inside Back Cover
*American Pulverizer Co. ... 93
Anchor Concrete Machy. Co. ... 79
Atlantic Equipment Corp. ... 98

Bacon, Inc., Earle C. ... 62
*Barber-Greene Co. ... 13
Barlum Hotel ... 96
*Bay City Shovels, Inc. ... 72
*Bethlehem Steel Company ... 19
Birmingham Rail & Locomotive Co. 98
*Blaw-Knox Co. ... 84-95
Bristol Co. ... 95
Broadcast Section ... 98-103
*Brooks Equipment & Mfg. Co. ... 4
Bucyrus-Erie Co. ... 18
Bucyrus-Monighan Co. ... 18
*Buell Engineering Co. ... 22
Butler Brothers ... 101

Carlyle Rubber Co., Inc. ... 103
Caterpillar Tractor Co. ... Back Cover
Chicago Perforating Co. ... 70
*Chicago Bridge & Iron Co. ... 85
*Chicago Steel Foundry Co. ... 68
*Cincinnati Rubber Mfg. Co. ... 58
Cleveland Wire Cloth & Mfg. Co. ... 104
Commercial Shearing & Stamping Co., The ... 79
Consolidated Products Co., Inc. ... 99
Contractors Service Corp. ... 101

Davenport Locomotive Works ... 93
*Deister Concentrator Co. ... 72
*Deister Machine Co. ... 67
*Dempster Bros., Inc. ... 87
*Dixie Machy. Mfg. Co. ... 60
Dreifus Co., Charles ... 101
Dunn Mfg. Co., W. E. ... 88

*Eagle Iron Works ... 90
*Easton Car & Const. Co. ... 63
*Ensign-Bickford Co., The ... 14
Equipment Corporation of America 101
Euclid Road Machy. Co. ... 1

Fitler Co., The Edwin H. ... 64
Frog, Switch & Mfg. Co. ... 64
Fuller Co. ... 12

Gelbman, Louis ... 87
Goodyear Tire & Rubber Co. ... 2
Grey Steel Products Co., Inc. ... 101
*Gruendler Crusher & Pulverizer Co. 66

*Haiss Mfg. Co., Inc., Geo. ... 64
Harnischfeger Corp. ... 95
*Hazard Wire Rope Div. American Chain & Cable Co., Inc. Inside Front Cover
*Hendrick Mfg. Co. ... 96
Hetherington & Berner, Inc. ... 95
Hoffman Bros. Drilling Co. ... 102

Industrial Brownhoist ... 97
Iowa Manufacturing Co. ... 15
Iron & Steel Products, Inc. ... 98

*Jackson & Church Co. ... 86
Jaeger-Lembo Machine Corp. ... 100
*Jaeger Machine Co. ... 81
*Jeffrey Mfg. Co. ... 10
Jones Fdry. & Machine Co., W. A. ... 91

*Kansas City Hay Press Co. ... 97
Kent Machine Co. ... 79

Laughlin Co., The Thomas ... 71
*Le Tourneau, Inc., R. G. ... 9
Lewistown Foundry & Machine Co. 96
*Lima Locomotive Works, Inc. ... 92
*Link-Belt Co. ... 92
Lippman Engineering Works ... 101
Ludlow-Saylor Wire Co. ... 96

Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc. ... 96
Marion Steam Shovel Co. ... 6-7
Marmon-Herrington Co. ... 97
McGann Mfg. Co., Inc. ... 94
*McLanahan & Stone Corp. ... 96
McLeod, Alex T. ... 98
*Merrick Scale Mfg. Co. ... 66
Miles Mfg. Co., The ... 85
*Morris Machine Works ... 91
*Multiplex Concrete Machy. Co. ... 86

National Industrial Advertisers Association ... 20
National Supply Co. ... 17
*National Wire Cloth Co. ... 87
Naylor Pipe Co. ... 93
New Holland Machine Co. ... 65
*Nordberg Mfg. Co. ... 21

Owen Bucket Co., The ... 104

Page Engineering Co. ... 57
Pennsylvania Drilling Co. ... 102
*Pioneer Engineering Works ... 97
Plymouth Locomotive Works ... 67

Quaker Rubber Corp. ... 11
Quinn Wire & Iron Works ... 84

Ransome Concrete Machy. Co. ... 85
*Raymond Pulverizer Div. of Combustion Engineering Co., Inc. ... 16
Republic Rubber Div. of Lee Rubber & Tire Corp. ... 89
*Robins Conveying Belt Co. ... 24
*Roebling's Sons Co., John A. ... 59

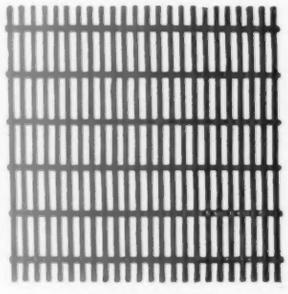
*Sauerman Bros., Inc. ... 86
Simplicity Engineering Co. ... 68
*Sly Manufacturing C., The W. W. ... 63
*Smidth & Co., F. L. ... 97
Smith, Inc., L. B. ... 99
Smith Engineering Works ... 5
*T. L. Smith Co., The ... 83
Southern Iron & Equipment Co. ... 98
Sprout, Waldron & Co. ... 97
Stanhope, Inc., R. C. ... 103
Stearns Mfg. Co. ... 73
Stonex Industries ... 84
Stolz-Sickles Co. ... 94
Superior Engine Division, The National Supply Co. ... 17

Taylor Forge & Pipe Works ... 69
Thew Shovel Co. ... 3
Thornton Tandem Co. ... 61
*Traylor Engineering Mfg. Co. ... 89
Twin City Iron & Wire Co. ... 97
*Tyler Co., W. S., The ... 62

Union Wire Rope Corp. ... 94
*Universal Crusher Co. ... 69
Universal Road Machy. Co. ... 94

Walsh Co., R. P. ... 99
*Warren Bros. Roads Co. ... 92
Wellman Engineering Co. ... 65
Woodstock Typewriters ... 87

*** See also Detail Information in the 1940 Pit and Quarry HANDBOOK**



Rolled Slot

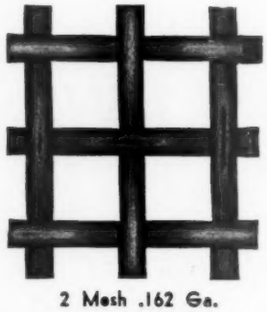
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

GIVE ME AMERICAN CABLE
TRU-LAY PREFORMED
Every Time—
1 It resists kinking
2 It spools better
3 It requires no seizing
4 Broken crown wires lie flat and in place
5 It is easier and safer to handle
6 It reduces unproductive shutdowns
7 It lasts longer—gives better service
AMERICAN CABLE
TRU-LAY Preformed
WIRE ROPE

"Whenever my ropes must operate over sheaves or drums . . . then I want American Cable's TRU-LAY Preformed. It has greater fatigue resistance; lasts longer; is easier to work."

So say thousands of operators from every industry. Nor do they say and believe that just because *we* insist upon it in magazine advertisements. They *know* from actual field and plant experience extending over a period of years.

Join the rapidly increasing ranks of industrial money and time savers by specifying American Cable's TRU-LAY Preformed. *All* American Cable's Wire Ropes made of Improved Plow Steel are identified with the Emerald Strand.

BUY ACCO QUALITY—*whether in American Cable Division's Ropes—American Chains (Weed Tire Chains and Welded or Weldless Chains)—Campbell Abrasive Cutting Machines—Page Wire Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Quality Products.*

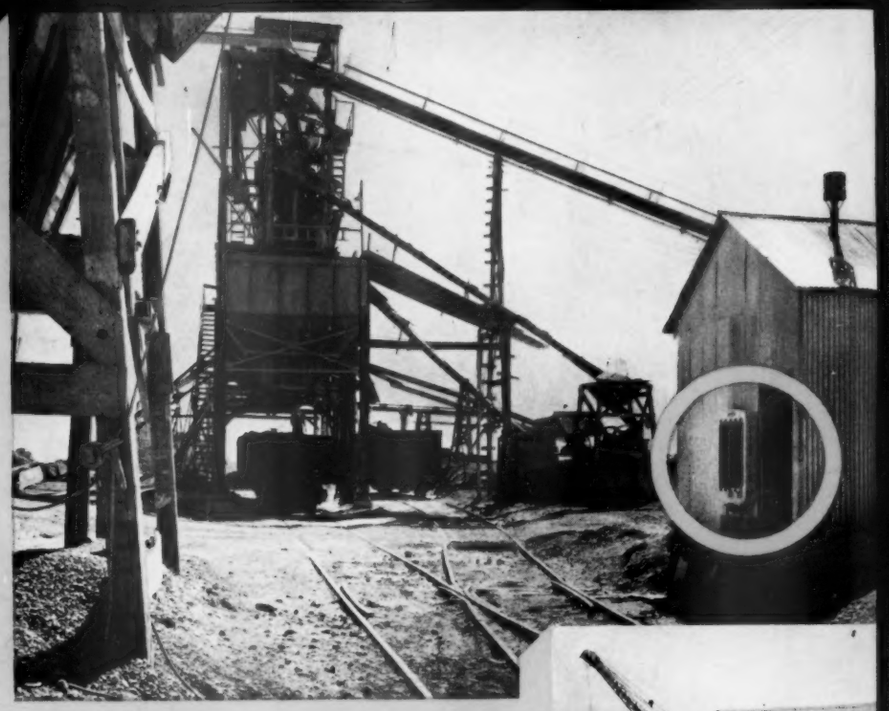
AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA
District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

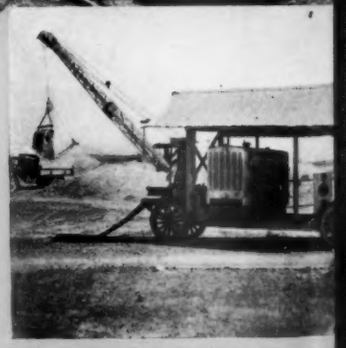
Green Signifies Full Speed Ahead for National Preparedness

AMERICAN CHAIN & CABLE COMPANY, Inc.

SAVING

$2200.00 a year!





By DRIVING its entire plant with a "Caterpillar" Diesel Engine, the Fordyce Gravel Co., of Pharr, Texas, has cut its annual power-cost from four thousand dollars to *only eighteen hundred!*

Low consumption of low-cost fuel does it . . . and so does "Caterpillar" Diesel long-life, heavy-duty construction which holds the cost of maintenance-repairs to a minimum!

Profits come from *savings* as well as from sales—when "Caterpillar" Diesel Power drives your plant. See your nearest "Caterpillar" dealer, or write direct to the factory today, for specifications that will fit your set-up!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

• The Sullivan City (Texas) plant of the Fordyce Gravel Co., which is powered entirely by a "Caterpillar" Diesel D13000 Engine driving a Westinghouse generator. Engine uses only about 5 gallons of 4-cent fuel an hour!

• Another "Caterpillar" Diesel Engine owned by the Fordyce Gravel Co. This one is 7 years old — and has run a total of 21,000 hours! Repairs, in all that time, are estimated at only $275. Belted to a generator, this engine powers a 1¼-yard electric shovel which handles 120 yards an hour. Engine uses only 3 gallons of low-cost fuel an hour!

CATERPILLAR

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